# ENVIRONMENTAL BEST PRACTICES FOR HIGHWAY MAINTENANCE ACTIVITIES

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and Infrastructure

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# Acknowledgements

The first issue of this manual (2004) was produced with the guidance of an Inter-Agency Steering Committee comprised of personnel from the BC Ministry of Transportation and Infrastructure (MoT), and the BC Ministry of Environment (formerly BC Ministry of Water, Land and Air Protection). Input at that time was provided by a large cross section of staff from both ministries, as well as representatives from Fisheries and Oceans Canada and MoT's Road and Bridge Maintenance Contractors.

This version of the document reflects the most recent feedback from both staff and contractors, and incorporates the latest environmental best practices information available for highway operations activities. It is the intention to keep this manual current through continuous updating and improvement.

The contribution of all those involved is acknowledged and sincerely appreciated.

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# 1 Introduction and Scope

The Ministry of Transportation and Infrastructure (MoT), contracts the maintenance of British Columbia's provincial highways to privatized Road and Bridge Maintenance Contractors. These contractors play an essential role in meeting the Ministry's mandate to provide safe transportation, and to carry out all work in an environmentally responsible manner.

To assist in this latter objective, the Ministry has developed this manual of Environmental Best Management Practices for Highway Maintenance Activities. These standardized practices and protocols are designed to be applicable across the province, and to serve as a practical and cost effective means for contractors to meet regulatory agency requirements, and public expectations for environmental protection.

The document is an integral component of a Memorandum of Understanding between the Ministry of Transportation and Infrastructure and the Ministry of Environment regarding operational environmental stewardship for highway maintenance (see Section 8 for further information).

The scope of this document is limited to the potential environmental concerns associated with the routine maintenance activities described in the Ministry's Highway Maintenance Contracts Maintenance Specifications, but also includes information for several topic areas that are integral to highway operations.

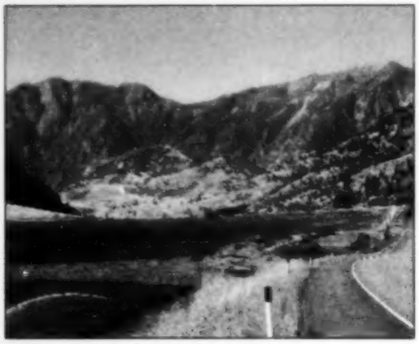
The Ministry's Highway Maintenance Contracts Maintenance Specifications document is available at:

http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Schedule_21_Maintenance_Specifications.pdf

Sixteen environmental best practices have been developed for 9 maintenance categories, and covering 35 specific MoT maintenance activities. These best practices are cross-referenced to the actual specification numbers and maintenance activity headings used in the Contract Maintenance Specifications. The following Table 1 matrix outlines the environmental best practices developed, and the location of additional information applicable to the related maintenance activities.

In cooperation with local regulators, MoT staff in some Ministry Districts, have also worked to develop local environmental best practices for specific maintenance activities. These locally-developed protocols are referenced where appropriate, and provide additional guidance.

This manual is intended to be a living document—one that will continue to evolve through implementation of the best practices, and through continued dialogue with Maintenance Contractors. Ultimately the implementation of appropriate environmental best practices should help reduce the permit requirements for certain highway maintenance activities that are routine in nature, and regularly undertaken.



### Table 1. Maintenance Activity/BP Reference Matrix

| Category | MoT Maintenance Activity | Maintenance Specification Number | BP Name | Page # |
|---|---|---|---|---|
| **Surface Maintenance** | Highway Pavement Patching and Crack Sealing | 1-100 | Highway Surface Management | 16 |
| | Highway Surface Treatment | 1-110 | Highway Surface Management | 16 |
| | Gravel Surface Grading and Re-shaping | 1-130 | Gravel Surface Management | 21 |
| | Dust Control and Base Stabilization | 1-140 | Dust Management | 26 |
| | Highway Surface and Shoulder Gravelling | 1-150 | Gravel Surface Management | 21 |
| | Highway Shoulder Maintenance | 1-160 | Gravel Surface Management | 21 |
| | Road Base Maintenance | 1-170 | Gravel Surface Management | 21 |
| | Pavement Surface Cleaning | 1-180 | Gravel Surface Management | 16 |
| | Debris Removal | 1-190 | Debris Removal | 31 |
| **Drainage Maintenance** | Ditch and Watercourse Maintenance | 2-250 | Ditch and Watercourse Management[1] | 36 |
| | Drainage Appliance Maintenance | 2-260 | Drainage Appliance Management[1] | 43 |
| | Shore, Bank and Watercourse Maintenance | 2-270 | Shore, Bank and Watercourse Maintenance[1] | 51 |
| | Engineered Wetland and Water Quality Pond Maintenance | 2-280 | Engineered Wetland and Water Quality Pond Maintenance | 59 |
| **Winter Maintenance** | Highway Snow Removal | 3-300 | Winter Road Maintenance | 65 |
| | Winter Abrasive and Chemical Snow and Ice Control | 3-310 | Winter Road Maintenance | 65 |
| | Roadside Snow and Ice Control | 3-320 | Winter Road Maintenance | 65 |
| | Highway Condition Reporting | 3-330 | No BP available | N/A |
| **Roadside Maintenance** | Roadside Vegetation Control | 4-350 | Roadside Vegetation Management | 70 |
| | Litter Collection and Graffiti Removal | 4-370 | No BP available | N/A |
| | Rest Area and Roadside Facilities Maintenance | 4-380 | Rest Area and Roadside Facilities Management | 76 |
| | Roadside Fence Maintenance | 4-400 | Roadside Fence Maintenance | 83 |
| **Traffic Maintenance** | Sign System Maintenance | 5-440 | No BP available | N/A |
| | Temporary Line Marking and Eradication | 5-450 | No BP available | N/A |
| | Highway Traffic Control | 5-470 | No BP available | N/A |

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[1] Other provincially-applicable best practices documents are also available for this specific maintenance activity.

**Table 1. Maintenance Activity/BP Reference Matrix**

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| | Gravel Surface Grading and Re-shaping | 1-130 | Gravel Surface Management | 23 |
| | Dust Control and Base Stabilization | 1-140 | Dust Management | 26 |
| | Highway Surface and Shoulder Gravelling | 1-150 | Gravel Surface Management | 23 |
| | Highway Shoulder Maintenance | 1-160 | Gravel Surface Management | 23 |
| | Road Base Maintenance | 1-170 | Gravel Surface Management | 23 |
| | Pavement Surface Cleaning | 1-180 | Gravel Surface Management | 16 |
| | Debris Removal | 1-190 | Debris Removal | 31 |
| **Drainage Maintenance** | Ditch and Watercourse Maintenance | 2-250 | Ditch and Watercourse Management[1] | 36 |
| | Drainage Appliance Maintenance | 2-260 | Drainage Appliance Management[1] | 43 |
| | Shore, Bank and Watercourse Maintenance | 2-270 | Shore, Bank and Watercourse Maintenance | 51 |
| | Engineered Wetland and Water Quality Pond Maintenance | 2-280 | Engineered Wetland and Water Quality Pond Maintenance | 59 |
| **Winter Maintenance** | Highway Snow Removal | 3-300 | Winter Road Maintenance | 65 |
| | Winter Abrasive and Chemical Snow and Ice Control | 3-310 | Winter Road Maintenance | 65 |
| | Roadside Snow and Ice Control | 3-320 | Winter Road Maintenance | 65 |
| | Highway Condition Reporting | 3-330 | No BP available | N/A |
| **Roadside Maintenance** | Roadside Vegetation Control | 4-350 | Roadside Vegetation Management | 70 |
| | Litter Collection and Graffiti Removal | 4-370 | No BP available | N/A |
| | Rest Area and Roadside Facilities Maintenance | 4-380 | Rest Area and Roadside Facilities Management | 76 |
| | Roadside Fence Maintenance | 4-400 | Roadside Fence Maintenance | 83 |
| **Traffic Maintenance** | Sign System Maintenance | 5-440 | No BP available | N/A |
| | Temporary Line Marking and Eradication | 5-450 | No BP available | N/A |
| | Highway Traffic Control | 5-470 | No BP available | N/A |

---

[1] Other provincially-applicable best practices documents are also available for this specific maintenance activity.

### Table 1. Maintenance Activity/BP Reference Matrix (cont'd)

| Category | MoT Maintenance Activity | Maintenance Specification Number | BP Name | Page # |
|---|---|---|---|---|
| Structure Maintenance | Bridge Deck Maintenance | 6-500 | Bridge Structure Management | 88 |
| | Bridge and Structure Cleaning | 6-510 | Bridge Structure Management | 88 |
| | Bridge Drain and Flume Maintenance | 6-520 | Bridge Structure Management | 88 |
| | Bridge Joint Maintenance | 6-530 | Bridge Structure Management | 88 |
| | Bridge Bearing Maintenance | 6-540 | Bridge Structure Management | 88 |
| | Bailey and Acrow Bridge Maintenance | 6-560 | Bridge Structure Management | 88 |
| | Minor Painting of Bridge Structures | 6-570 | Bridge Structure Management | 88 |
| | Concrete Structure Maintenance | 6-600 | Bridge Structure Management | 88 |
| | Steel and Aluminum Structure Maintenance | 6-605 | Bridge Structure Management | 88 |
| | Timber Truss Bridge Maintenance | 6-620 | Bridge Structure Management | 88 |
| | Bridge Piling Maintenance | 6-640 | Bridge Structure Management | 88 |
| | Timber and Log Structure Maintenance | 6-650 | Bridge Structure Management | 88 |
| | Retaining Structure Maintenance | 6-660 | Retaining Structure Management | 96 |
| | Multiplate Structure Maintenance | 6-680 | Multiplate Structure Maintenance | 101 |
| | Bridge Railing Maintenance | 6-690 | Bridge Structure Management | 88 |
| | Debris Torrent Structure Maintenance | 6-740 | No BP available | N/A |
| Emergency Maintenance | Flood Control and Washout Response | 7-760 | No BP available | N/A |
| | Mud, Earth and Rock Slide Response | 7-770 | No BP available | N/A |
| | Highway Incident and Vandalism Response | 7-780 | Highway Incident and Vandalism Response | 107 |
| | Snow Avalanche Response | 7-790 | No BP available | N/A |
| | Structural Damage Response | 7-800 | No BP available | N/A |
| | Bailey and Acrow Emergency Installation | 7-810 | No BP available | N/A |
| Inspection | Highway Inspection | 8-830 | No BP available | N/A |
| | Highway Patrol | 8-840 | No BP available | N/A |
| | Bridge Inspection | 8-850 | No BP available | N/A |
| Other | Gravel Pit Operations | No Spec | Gravel Pit Operations | 110 |

Additional BPs have been developed for application to a range of general and specific highway maintenance activities that may be routinely undertaken. These BPs and their location within this document are listed in Table 2.

**Table 2. Supplementary Best Practices Applicable to General and Specific Highway Maintenance Activities**

| Category | MoT Maintenance Activity | BP Name | Page # |
|---|---|---|---|
| **General** | Erosion and Sediment Control | Erosion and Sediment Control | 116 |
| | Invasive Plant Management | Invasive Plant Management | 122 |
| | Use of Potentially Harmful Substances | Use of Potentially Harmful Substances | 127 |

**Table 1. Maintenance Activity/BP Reference Matrix (cont'd)**

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| | Bridge Drain and Flume Maintenance | 6-520 | Bridge Structure Management | 88 |
| | Bridge Joint Maintenance | 6-530 | Bridge Structure Management | 88 |
| | Bridge Bearing Maintenance | 6-540 | Bridge Structure Management | 88 |
| | Bailey and Acrow Bridge Maintenance | 6-560 | Bridge Structure Management | 88 |
| | Minor Painting of Bridge Structures | 6-570 | Bridge Structure Management | 88 |
| | Concrete Structure Maintenance | 6-600 | Bridge Structure Management | 88 |
| | Steel and Aluminum Structure Maintenance | 6-605 | Bridge Structure Management | 88 |
| | Timber Truss Bridge Maintenance | 6-620 | Bridge Structure Management | 88 |
| | Bridge Piling Maintenance | 6-640 | Bridge Structure Management | 88 |
| | Timber and Log Structure Maintenance | 6-650 | Bridge Structure Management | 88 |
| | Retaining Structure Maintenance | 6-660 | Retaining Structure Management | 96 |
| | Multiplate Structure Maintenance | 6-680 | Multiplate Structure Maintenance | 101 |
| | Bridge Railing Maintenance | 6-690 | Bridge Structure Management | 88 |
| | Debris Torrent Structure Maintenance | 6-740 | No BP available | N/A |
| **Emergency Maintenance** | Flood Control and Washout Response | 7-760 | No BP available | N/A |
| | Mud, Earth and Rock Slide Response | 7-770 | No BP available | N/A |
| | Highway Incident and Vandalism Response | 7-780 | Highway Incident and Vandalism Response | 107 |
| | Snow Avalanche Response | 7-790 | No BP available | N/A |
| | Structural Damage Response | 7-800 | No BP available | N/A |
| | Bailey and Acrow Emergency Installation | 7-810 | No BP available | N/A |
| **Inspection** | Highway Inspection | 8-830 | No BP available | N/A |
| | Highway Patrol | 8-840 | No BP available | N/A |
| | Bridge Inspection | 8-850 | No BP available | N/A |
| **Other** | Gravel Pit Operations | No Spec | Gravel Pit Operations | 110 |

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| | Invasive Plant Management | Invasive Plant Management | 122 |
| | Use of Potentially Harmful Substances | Use of Potentially Harmful Substances | 127 |

# 2 How to Use This Document

This document is organized into three main sections:

1 – Key Environmental Concerns, where environmental issues arising from highway maintenance and operational activities are discussed;

2 – Legislative Requirements and Performance Standards, where environmental objectives, standards, and legal requirements for highway maintenance activities are summarized; and

3 – Environmental Best Practices (BPs), where suggested resources, planning tools, and technique options are presented for various types of highway maintenance activities.

This format will help different user groups to quickly access information that is particularly relevant to them. For example, when planning maintenance activities, a review of the Key Environmental Concerns and Legislative Requirements and Performance Standards sections will help identify environmental issues and standards relating to the works involved. Or, if assembling work plans and preparing for work on a particular site, the Best Practices section will provide guidance to help meet the requirements of performance standards and environmental legislation.

Both supervisors and highway maintenance field crews can use the BPs as well as the links provided to other BP sources as guides to meeting performance standards and environmental legislation. Examples of regulatory agency protocols and BPs that have been developed in parts of the province are also provided for certain activities. Maintenance Contractors are encouraged to develop similar protocols with regulatory agency staff in their local area.

Electronic “links” to other sources of BP information are provided to supplement the BP section and to assist in identifying appropriate environmental protection measures that address the specific concerns of the project site.

# 3 Key Environmental Concerns

Many aspects of highway maintenance are routine, and carry little risk of environmental harm. However, some highway maintenance activities have the potential to cause negative physical, chemical and biological impacts to the surrounding environment. These impacts to fish and wildlife habitats and species, and water, air and soil quality can be significant and enduring. Site-specific factors such as proximity of the work site to environmentally sensitive areas, the scale of the work, and the type of materials used can influence the level of risk that a maintenance activity poses to the environment.

Maintenance and construction activities completed in and adjacent to watercourses are of particular concern because of their potential for wide-reaching effects on fish, wildlife and their habitats. Primary impacts are associated with inputs of pollutants, reductions in flow, and the physical alteration of channel banks, shorelines and adjacent vegetation. These may have direct effects (e.g., lethal) or indirect effects (e.g., barriers to movement) on fish and wildlife.

Table 3 provides a summary of some of the key environmental concerns related to highway maintenance activities. A variety of documents exist which provide further information related to assessing potential environmental impacts – several of these documents are listed in Section 11. One document produced by Fisheries and Oceans Canada (DFO), Road Maintenance Activities and *The Fisheries Act:* A Guidance Document to Avoiding Conflict (Stoneman et al, 1997), provides guidance regarding impacts to fish habitat resulting from a range of highway maintenance works.

How do you know what effects highway maintenance works may have on the environment? Table 4 contains a summary of potential environmental impacts for each type of maintenance activity described in this document.

Table 3. Key environmental concerns related to highway maintenance activities.

| CONCERN | ACTIVITIES | SOURCES | CONDITION | IMPACT |
|---|---|---|---|---|
| **Water Quality** | • Surface and structure maintenance<br>• Clearing and grubbing<br>• Debris removal | • Disturbed soil<br>• Culverts/ channels<br>• Ineffective soil stabilization/site restoration | Increased erosion and sedimentation | • Spawning grounds become covered with sediment and made unusable; deposited eggs are covered and suffocate<br>• Increases turbidity of the water; fish cannot see their prey (i.e., food items); food sources become buried or leave the area<br>• Fish gills become clogged; decreased respiration; mortality<br>• Turbidity decreases passage of light through the water column, affecting photosynthesis; aquatic plants do not grow as well |
|  | • Surface and structure cleaning and repair<br>• Clearing and grubbing<br>• Equipment use and servicing<br>• Rest area maintenance | • Materials (concrete, chlorinated water)<br>• Storage piles (de-icing compounds)<br>• Equipment fluids and fuel<br>• Water wells<br>• Septic disposal fields | Flow of contaminated material/runoff into a watercourse or potable water source | • Contaminated material can impair water quality through a change in water chemistry (e.g., pH, dissolved oxygen) that may have direct or indirect effects on fish and aquatic life<br>• Organic contaminants (e.g., phosphates) cause excessive growth of algae and decrease available dissolved oxygen to fish<br>• Contamination of drinking water by bacteria can result in serious public health issues |
| **Water Quantity** | • Vegetation removal<br>• Soil compaction | • Uninterrupted overland flow<br>• Reduced infiltration | Increased runoff from surrounding areas | • Increased water levels cause bank erosion, channel scour and affect riparian vegetation<br>• Possible habitat destruction, fish populations suffer<br>• "Flashy" hydrograph; reduction in base flows |
|  | • Worksite water management (isolation and diversion) | • Intercepted flow and redirection | Decreased water volume (from small tributaries or ground water) | • Downstream flows decreased<br>• Possible habitat loss; populations suffer decreased volume in tributaries<br>• Possible reduction in fish passage<br>• Decreased quantity in waterway may increase temperature, causing fish to avoid the waterway; loss of species to that area |

## Table 3. Key environmental concerns related to highway maintenance activities continued

| CONCERN | ACTIVITIES | SOURCES | CONDITION | IMPACT |
|---|---|---|---|---|
| **Stream Habitat Alterations** | • Instream construction and maintenance activities<br>• Vegetation or debris removal | • Watercourse crossings and ditches<br>• New or modified structures<br>• Access road construction | Alteration, disruption or destruction of instream habitat | • Loss of instream and channel structure (e.g., boulders, woody debris, root systems) reduces habitat complexity and overall habitat value; productive capacity of habitat reduced; habitat enhancement or compensation required to off set loss<br>• Alterations to habitat have potential to hydraulically affect other reaches of the watercourse |
| | • Project design, construction and maintenance | • Diversions to accommodate infrastructure<br>• Bank stabilization measures | Alteration of natural channel flow (blockage by debris dams, culverts, etc) | • Fish passage is affected; fish may not be able to access upper reaches of waterways or spawning grounds; ecological balance may be upset by removal of fish from an area where they acted as predators or prey |
| **Riparian Habitat Alterations** | • Clearing and grubbing<br>• Access to watercourse crossing structures | • Riparian zone disturbance or alteration | Alteration of riparian vegetation | • Critical functions (i.e., erosion control, filtering function, climate control) provided by riparian vegetation are lost; altered function affects quality and value of fish habitat; productive capacity decreases<br>• Surface flow rate increases causing potential for bank scour |
| **Invasive Plants** | • Vegetation removal, transport, and disposal<br>• Soil disturbance, removal and transport | • Disturbance or movement of soils<br>• Equipment<br>• Gravel pits | Contributes to the spread of noxious weeds and invasive plants | • May contribute to the spread of noxious weeds if material is improperly handled or disposed of.<br>• May displace native vegetation |
| **Wildlife** | • Clearing and grubbing<br>• Roadside vegetation management<br>• Wildlife exclusion fencing maintenance | • Disturbance of habitat and movement corridors | Habitat loss and fragmentation | • Loss or alteration of viable wildlife habitat and movement corridors<br>• Impact to wildlife species at risk |

**Table 4. Summary of routine highway maintenance activities and their potential environmental impacts.**

| Maintenance Activity | Instream Habitat Alteration | Vegetation Removal / Alteration | Invasive Plant Management | Potential Impacts to Human Health | Effects on Wildlife | Water Quality |  |  |  | Water Quantity |  |
|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  | Sediment Release | Concrete Leachate Release | Other Contaminants Release | De-icing Compounds Use / Release | Disruption of Flow | Withdrawal of Water |
| Highway Surface Management |  |  |  |  |  | ✓ | ✓ | ✓ | ✓ |  |  |
| Gravel Surface Management |  |  | ✓ | ✓ |  | ✓ |  | ✓ |  |  | ✓ |
| Dust Management |  |  |  | ✓ |  | ✓ |  | ✓ |  |  | ✓ |
| Debris Removal |  |  | ✓ | ✓ |  | ✓ |  | ✓ | ✓ |  |  |
| Ditch and Watercourse Management | ✓ | ✓ |  |  | ✓ | ✓ |  | ✓ |  | ✓ |  |
| Drainage Appliance Management | ✓ | ✓ | ✓ |  | ✓ | ✓ | ✓ | ✓ |  | ✓ |  |
| Shore, Bank and Watercourse Management | ✓ | ✓ | ✓ |  | ✓ | ✓ |  | ✓ |  | ✓ |  |
| Engineered Wetland and Water Quality Management |  |  | ✓ |  |  | ✓ |  | ✓ |  |  |  |
| Winter Road Management |  | ✓ |  | ✓ | ✓ | ✓ |  | ✓ | ✓ |  |  |
| Roadside Vegetation Management |  | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ |  |  |  |
| Rest Area and Roadside Facilities Management |  |  | ✓ | ✓ | ✓ |  |  | ✓ |  |  |  |
| Bridge Structure Management | ✓ | ✓ |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Retaining Structure Management | ✓ | ✓ |  |  |  | ✓ | ✓ | ✓ | ✓ | ✓ |  |
| Multiplate Structure Management | ✓ | ✓ |  |  |  | ✓ | ✓ | ✓ |  | ✓ |  |
| Highway Incident and Vandalism Response |  |  |  |  |  | ✓ |  | ✓ |  |  |  |
| Roadside Fence Maintenance | ✓ | ✓ | ✓ |  | ✓ | ✓ | ✓ |  |  |  |  |
| Gravel Pit Operations |  | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ |  |  |  |

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| Maintenance Activity | Instream Habitat Alteration | Vegetation Removal / Alteration | Invasive Plant Management | Potential Impacts to Human Health | Effects on Wildlife | Water Quality | | | | Water Quantity | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Sediment Release | Concrete Leachate Release | Other Contaminants Release | De-icing Compounds Use / Release | Disruption of Flow | Withdrawal of Water |
| Highway Surface Management | | | | | | ✓ | ✓ | ✓ | ✓ | | |
| Gravel Surface Management | | | ✓ | ✓ | | ✓ | | ✓ | | | ✓ |
| Dust Management | | | | ✓ | | ✓ | | ✓ | | | ✓ |
| Debris Removal | | | ✓ | ✓ | | ✓ | | ✓ | ✓ | | |
| Ditch and Watercourse Management | ✓ | ✓ | | | ✓ | ✓ | | ✓ | | ✓ | |
| Drainage Appliance Management | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | | ✓ | |
| Shore, Bank and Watercourse Management | ✓ | ✓ | ✓ | | ✓ | ✓ | | ✓ | | ✓ | |
| Engineered Wetland and Water Quality Management | | | ✓ | | | ✓ | | ✓ | | | |
| Winter Road Management | | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ | | |
| Roadside Vegetation Management | | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | | |
| Rest Area and Roadside Facilities Management | | | ✓ | ✓ | ✓ | | | ✓ | | | |
| Bridge Structure Management | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Retaining Structure Management | ✓ | ✓ | | | | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Multiplate Structure Management | ✓ | ✓ | | | | ✓ | ✓ | ✓ | | ✓ | |
| Highway Incident and Vandalism Response | | | | | | ✓ | | ✓ | | | |
| Roadside Fence Maintenance | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | | | |
| Gravel Pit Operations | | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | | |

# 4 Legal Requirements and Performance Standards

## 4.1 What Legal Requirements Apply to My Works?

In addition to the commitment of the MoT to environmental protection and the public expectation that the Ministry and its Maintenance Contractors will do their part in protecting environmental values, all work must be compliant with (i.e., meet the requirements of) applicable environmental legislation (federal, provincial, and local). This legislation may regulate where, when and how highway maintenance operational activities can be carried out. A table summarizing the primary legal requirements applicable to highway maintenance activities is provided on the following page (Table 5).

**Due Diligence**

To ensure that highway maintenance work is undertaken in a manner that demonstrates environmental due diligence, there is a responsibility to:

1. Be familiar with the municipal, provincial, and federal legal requirements;
2. Recognize and address the potential environmental impacts of works to the physical, chemical, and biological components of the environment;
3. Avoid, mitigate or lessen those impacts or risks in the planning of work;
4. Ensure the protection of properties and human health;
5. Obtain the appropriate permits and authorizations from all regulatory agencies before proceeding with activities; and
6. Conduct works in a manner that complies with the law and avoids, mitigates or lessens potential impacts to aquatic and riparian habitats, water quality and quantity, fish and wildlife populations, and public safety and property.

**Note:**

Some of the information provided in this document is referenced from legislation. However, this document should not be considered an official copy of legislation. If a discrepancy arises between this document and legislation, the legislation takes precedence. The Province of British Columbia does not guarantee the accuracy or completeness of the information referenced here from legislation, and in no event is the Province liable or responsible for damages of any kind arising out of its use.

# Table 5. Summary of Key Environmental Legislation, Regulations and Policy Applicable to Highway Maintenance Activities.

| Statute | Section(s) / Regulations | Regulating Agency | Area of Regulation | Potential Approval or Permit Requirements | Maximum Penalties |
|---|---|---|---|---|---|
| ***Fisheries Act*** | Section 35(1) | Fisheries and Oceans Canada | Prohibits harmful alteration, disruption or destruction (HADD) of fish habitat | Application to DFO for an Authorization for a HADD of fish habitat may be required | Summary convictions – fines up to $100,000 per offence per day or up to 1 year of imprisonment. Indictable offences – fines up to $500,000 per offence per day or up to 2 years of imprisonment, or both. Court orders may require the restoration of impacted areas |
|  | Sections 34(1), 36(3) | Fisheries and Oceans Canada; Environment Canada | Prohibits the deposit of deleterious substances into waters frequented by fish | Deposit of deleterious substance not permitted | Summary convictions – fines up to $100,000 per offence per day or up to 1 year of imprisonment. Indictable offences – fines up to $500,000 per offence per day or up to 2 years of imprisonment, or both. Court orders may require the restoration of impacted areas |
| ***Migratory Bird Convention Act*** | Section 12 | Environment Canada | Prohibits the injury, molestation, and destruction of migratory birds and their nests | A permit must be issued for all activities affecting migratory birds | Summary convictions – fines up to $100,000 for a corporation, up to $50,000 and/or 6months imprisonment for individuals. Indictable offences – fines up to $250,000 for a corporation, up to $100,000 and/or up to 5 years imprisonment for individuals. |
| ***Navigable Waters Protection Act*** | Sections 5(1), 6(1), 6(4), 10(1), 10(2) | Transport Canada | Prohibits the construction of marine projects and projects on navigable freshwater without approval under the act | Application may be required for an Approval under the *Act* | Summary convictions - fines not more than $5000. Costs may also be assessed for the removal of works. |
| ***Species at Risk Act (SARA)*** | Sections 32(1), 33 | Environment Canada | Prohibits the injury, possession, or destruction of any species protected under the *Act*, or alteration or destruction of a protected species' residence | Application to Ministry of Environment for permit approval under the *Act* | Maximum penalties ranging up to $1,000,000. |
| ***Environmental Management Act*** | Special Wastes Regulation | BC Ministry of Environment, Environmental Protection Division | Regulates the disposal and storage of hazardous materials and hazardous materials spill reporting | Application may be required for permits for the disposal and storage of special wastes | Fines ranging in value up to $1,000,000 or imprisonment for up to six months, or both. |
| ***Fish Protection Act*** | Section 40.1(1) | BC Ministry of Environment, Water Stewardship Division | Regulates activities that affect flow, fish habitat, and riparian areas. Requires the maintenance of flows, the establishment of setbacks, and the designation and protection of sensitive streams. | Approval for works in sensitive streams must be obtained from the comptroller or regional water manager. | No direct fines under the *Fish Protection Act*. Fines may be levied under associated acts. |

## Table 5. Summary of Key Environmental Legislation, Regulations and Policy Applicable to Highway Maintenance Activities.

| Statute | Section(s) / Regulations | Regulating Agency | Area of Regulation | Potential Approval or Permit Requirements | Maximum Penalties |
|---|---|---|---|---|---|
| ***Health Act*** | Sewage Disposal Regulations | BC Ministry of Health Services | Regulates the installation, construction and maintenance of sewage disposal facilities | A permit for the installation of a sewage system may be required under the act, provided the works meet the requirements of the Regulation. | Fines up to $200,000 for each day an offence continues and/or 12 months imprisonment. |
| ***Water Act*** | Section 9, *Water Act* Regulation, Part 7 | BC Ministry of Environment, Water Stewardship Division | Prohibits large works in or about a stream, and short-term use, storage and diversion of water unless an Approval has been obtained under the *act*. Protects water quality, habitat, and water users by regulating changes in and about a stream. | Application may be required to LWBC for a Section 9 *Water Act* Approval. Certain works are permitted under a notification process to MOE. | Fine of up to $200,000 per offence per day or to imprisonment not exceeding 12 months, or to both. |
| ***Weed Control Act*** | Weed Control Regulations | BC Ministry of Agriculture and Lands | Regulates the management of noxious weeds and prohibits the dispersal of weeds and their seed. | A permit and/or a Pest Management Plan is required for the chemical treatment of noxious weed and invasive plants on public land | Costs related to weed control activities. |
| ***Wildlife Act*** | Section 9, Section 34, Section 35 | BC Ministry of Environment, Fish and Wildlife Branch | Regulates works having impact on wildlife including the damage or removal of beaver dams; the possession, disturbance or destruction of birds, their eggs and nests; and the transportation and possession of carcasses | A permit must be obtained from WLAP to allow activities under the *act* including beaver dam and bird nest removal, and carcass possession and transportation. | Convictions under the *Wildlife Act* may lead to a fine of between $1,000 and $100,000, or a term of imprisonment not exceeding one year, or both. |

## 4.2 What is a Performance Standard?

A performance standard identifies the desired result for work that is carried out. It must be met to ensure compliance with applicable environmental legislation. In some cases, it may be defined by scientifically-supported maximum permissible disposal or impact thresholds (e.g., the concentration of a particular chemical in wastewater discharge). At other times, it may be a simple general statement such as the requirement to cause no harmful alteration, disruption or destruction of fish habitat.

Most of the performance standards that apply to routine highway maintenance activities are general statements rather than specific thresholds. In many cases, impact thresholds are site-specific, and may vary between regions and regulatory agencies. Staff from local MOE and DFO offices may be able to provide more information on specific impact thresholds related to a particular activity.

**SMART Objectives:**

**S**pecific

**M**easurable

**A**chievable

**R**ealistic

**T**ime Specific

### An Example Performance Standard: Deleterious Substance Discharge

The general performance standard identified is simply a restatement of a section of the *Fisheries Act*.: **No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)).**

Many highway maintenance works involve the disturbance of sediment and soil or the use of potentially hazardous or harmful materials. Without proper containment measures and careful use, these materials may be released to the environment as deleterious substances. A deleterious substance is any compound or material which, when introduced into the environment, causes a harmful effect. A substance may be considered deleterious because of its concentration or chemical or physical effects on the water quality and organisms within the watercourse or water body receiving the discharged substance.

Examples of deleterious (or potentially deleterious) substances resulting from highway maintenance activities include, but are not limited to:

- Runoff from patching and sealing compounds, tar, asphalt, and chemical surface treatments used in highway surface management activities
- Sediment in runoff from bridge deck cleaning activities, disturbed soils, newly applied gravel or riprap materials, and materials stockpiles
- Leachate and raw product from concrete and cement-based products used to repair concrete structures
- Runoff or overspray containing de-icing compounds and dust control palliatives
- Equipment oils and fuels

**The Sediment Question**

Studies have shown that the introduction of fine sediments generated directly from digging activity in the stream and indirectly from run-off from exposed soils has severe negative impacts on all life stages of fish and other aquatic life and their habitats. While no amount of a deleterious substance is permitted to be discharged, DFO uses the following threshold value to identify the level at which sediment becomes deleterious. Sediment becomes a deleterious substance when a water sample taken from the discharging water source has a total suspended solids (TSS) value more than **25mg/l** above the background TSS value of the receiving watercourse. During storm events, sediment-laden waters are considered deleterious when the TSS value of the discharging water source is more than **75mg/l** above the background TSS value for the receiving watercourse.

# 5 Environmental Best Practices for Maintenance Activities

The Environmental Best Practices (BPs) in this document have been demonstrated to be an effective and practical means of preventing or limiting harmful impacts to the environment. In the context of highway maintenance work, they include any operating method, measure, or device that controls, prevents, removes, or reduces an adverse impact to the environment.

Fisheries and Oceans Canada (DFO) have also developed a series of Operational Statements for low risk activities carried out in, and around water—including several that are applicable to highway maintenance activities, and these are referenced in Section 11. These Operational Statements outline environmental best practices to minimize impacts to fish and fish habitat, and achieve compliance with applicable performance standards.

The BPs provided in this document address the most common and routine highway maintenance practices. Other documents and resources that have more detailed information on specific BPs (e.g., erosion and sediment control BPs) are referenced throughout the various sections, and where available, web links are provided to key sources of this information. Appropriately qualified professionals may also provide advice on the selection and application of BPs, including the use of alternative practices.

Comprehensive environmental protection information, particularly as it relates to highway operational activities that involve construction, is available in the Ministry of Transportation and Infrastructure's Standard Specifications for Highway Construction – Section 165 – Protection of the Environment:

http://www.th.gov.bc.ca/Publications/const_maint/contract_serv/standard_specs/2009_Stand_Specs_Vol_1.pdf

## 5.1 Highway Surface Management

Highway surface management activities are undertaken to ensure public safety on our highways by maintaining clean, level, and unbroken road surface conditions through activities such as pavement cleaning, patching, application of surface treatments, and pavement crack sealing.

***Highway Maintenance Specification Sections***

**1-100** **Highway Pavement Patching and Crack Sealing**

**1-110** **Highway Surface Treatment**

**1-180** **Pavement Surface Cleaning**

**Available at:**

**http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Schedule 21 Maintenance Specifications.pdf**

### Environmental Issues

Primary environmental issues relating to routine highway surface management activities are summarized in the following table. It should be noted that site-specific conditions might present additional issues you will need to address in planning and undertaking your works.

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Patching and Sealing** | May introduce deleterious substances to a watercourse through runoff of patching and sealing compounds and chemical surface treatments | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). |
| | May contaminate surface waters, groundwater, and soils through improper storage or disposal of materials on site and at work yards | Reporting of any polluting substance spills (*Environmental Management Act*, Section 79(5)) and disposal of all waste materials in accordance with the *Act* (*Environmental Management Act*, Waste Disposal Regulation). |
| **Pavement Surface Cleaning** | May pose air quality concerns during spring cleaning of winter aggregate | Compliance with regional or local air quality bylaws and regulations. |
| | May introduce sediment or other deleterious substances to roadside watercourses through the side casting of materials cleaned from the highway surface | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). |
| | May contaminate surface waters, groundwater, and soils through improper disposal of collected winter aggregate that may contain hazardous materials (e.g., de-icing compounds) | Reporting of any polluting substance spills (*Environmental Management Act*, Section 79(5)) and disposal of all waste materials in accordance with the *Act* (*Environmental Management Act*, Waste Disposal Regulation). |

## Environmental Best Practices

The following BPs are provided as guidelines to help you ensure your works are completed in compliance with the performance standards and environmental legislation. Please note that the general BPs provided apply for most work activities within this category; if BPs specific to the activity are available they are also noted below.

### Regulatory Agency Contact

- Prior to beginning your surface management activities, identify any sensitive habitat areas, including watercourses—streams, lakes and marine foreshores, found within your work area.

- Determine how much impact your required works will have on the identified areas. Are you repairing a large area of paved surface immediately adjacent to a watercourse? Are you planning to clean accumulated winter aggregate from an area where air quality has been a concern in the past? Where will you place the material you have cleaned from the road surface? By asking these questions, you should be able to identify any planned works that may be of concern to regulatory agencies.

- Meet with the appropriate regulatory agency contact, as listed in Section 8, to discuss site-specific environmental protection measures. Refer to Section 7 for information on the Memorandum of Understanding with MoE, and the recommended protocol for maintaining regular communications with regulatory agencies.

### Timing of Works

For most work activities the following general BPs apply:

- Works are preferably undertaken during periods of dry weather (e.g., summer) as this allows easier control of deleterious materials and runoff. Typically this is also a less sensitive period for fish and wildlife than other seasons.

- If the work schedule requires working in the rain, take steps to install appropriate site isolation and sediment controls. You must ensure that any disturbance you create is contained and that the release of sediment-laden water or any other deleterious substances to nearby watercourses is prevented, particularly for surface repair works requiring the application of patching and sealing compounds, tar, asphalt, and chemical surface sealants.

**Surface Cleaning:**

- Surface cleaning activities are best scheduled after a rainfall, when accumulated aggregate is damp, easier to collect and less likely to generate dust.

- While a little rain may be helpful to crews cleaning pavement surfaces, work should be halted if precipitation continues or increases. Under heavy rainfall, disturbed materials are more likely to release sediment and other deleterious substances to nearby watercourses.

### Site Management

- When your works involve the disturbance of soils or the use or storage of erodible materials (e.g., sands, topsoil), prevent the transport of sediment through the installation of appropriate erosion and sediment control BPs and devices.

### Materials Storage

- Use temporary covers to keep erodible construction materials dry if they are stored on site near watercourses.

- Store hazardous materials (chemicals, sealants, patching materials) in accordance with applicable regulations and ensure that deleterious substances are handled with care.

- Mix concrete compounds, sealants or other chemicals used in a contained area and away from any watercourse if there is the potential for materials used in your work to contaminate soils or surface waters adjacent to the road surface.

- Clean equipment and tools off-site, if possible. Ensure that any wash water generated by cleaning tools and equipment is managed in a manner that will prevent its release to watercourses or road drains.

- Ensure all equipment used on site is well maintained and free of fluid leaks.

### Waste and Materials Containment

- Have a spill response plan in place and spill kits on site.

- If potentially deleterious materials (e.g., cement-based products) are used for repair works, ensure raw material and wash water will not be released to any watercourse.

- Where possible, sweep up loose material or debris. Any material thought to pose a risk of contamination to soils, surface water or groundwater should be disposed of appropriately off-site. Any clean material should be removed to an area where it will not enter any watercourse, ditch, or channel.

- Inspect drain blocks, sediment controls and wash water runoff areas regularly to ensure they are functioning. Repair as required.

#### Surface Cleaning:

- Keep aggregate from entering road drains, gutters and watercourses by cleaning or sweeping material away from these areas rather than using these structures as collection and disposal routes.

- Consider the potential impacts of side casting collected materials. Collected winter aggregate and other materials accumulated on the road surface may contain deleterious substances and have the potential to cause harm to surrounding soils, groundwater, and surface water. In some areas, collected aggregate is recovered and recycled for future use, while in other regions complete removal from the highway right of way is the preferred option for managing collected material. If collected material is to be disposed of on the highway right of way, designate disposal sites away from sensitive habitats and watercourses. Ensure that materials are placed in a manner that will prevent their future introduction to any watercourse.
- Consider the use of a cleaning system such as a vacuum sweeper or sweeper with applied water if dust generated by cleaning activities is a concern.

## Key Information Sources

The documents and websites listed below are recommended resources for highway surface management. They can provide examples of existing protocols and management strategies, as well as additional information on specific operational BPs (e.g., erosion and sediment control techniques).

### MoT Technical Circulars:

**Dust Abatement Chemicals** – MoT Technical Circular T-5/94

**Crack Sealing Asphalt Pavements** – MoT Technical Circular T-1/99

These and all other MoT Technical Circulars are available at:
http://www.th.gov.bc.ca/Publications/Circulars/Current_technical.asp

### Locally Developed BPs
### (Provide any locally-developed BPs):

- 
- 
-

### Other Resources:

**Roadway and Bridge Maintenance Water Quality BMPs.**
Environmental Protection Division, BC Ministry of Environment.
http://www.env.gov.bc.ca/wat/wq/nps/BMP_Compendium/nps_bmp.htm

**Catalogue of Stormwater Best Management Practices. September 2005.** Idaho Department of Environmental Quality.

http://www.deq.state.id.us/water/data_reports/storm_water/catalog/index.cfm

**Paving and Grinding Operations. March 2003.** CALTRANS Storm Water Quality Handbook: Construction Site Best Management Practices Manual. http://www.dot.ca.gov/hq/construc/stormwater/NS-03.pdf

**Asphalt – Pollution Prevention Best Management Practices.** Asphalt Pavement Association of West Virginia, West Virginia Department of Highways, West Virginia Department of Environmental Protection. http://www.asphaltwv.com/apa00%20bmp.pdf

**Storm Water Management Fact Sheet – Dust Control.** Sept. 1999. US EPA. http://www.epa.gov/OW-OWM.html/mtb/dustctr.pdf

## Checklist for Environmental Protection Requirements

☐ Is your proposed work considered a "routine" maintenance activity? If not, approvals or permits may be required. Contact your local municipal, provincial, or federal regulatory agency staff.

☐ Has this project been discussed with local environmental regulatory staff? In addition to the BP information presented, other site-specific conditions may apply.

☐ Have site-specific environmental protection requirements been identified? List below:

☐ ____________________

☐ ____________________

☐ ____________________

☐ ____________________

## 5.2 Gravel Surface Management

Gravel surface management includes activities such as gravelling and grading of unpaved road surfaces and maintenance of road shoulders (on both paved and unpaved roads) as required to maintain good road conditions and ensure public safety on highways and roads.

***Highway Maintenance Specification Sections***

**1-130** Gravel Surface Grading and Reshaping

**1-150** Highway Surface and Shoulder Gravelling

**1-160** Highway Shoulder Maintenance

**1-170** Road Base Maintenance

Available at:

http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Schedule 21 Maintenance Specifications.pdf

### Environmental Issues

Primary environmental issues relating to routine gravel surface management activities are summarized in the following table. It should be noted that site-specific conditions might present additional issues you will need to address in planning and undertaking your works.

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Patching and Sealing** | May introduce sediment or other deleterious substances to a watercourse through runoff from newly placed or disturbed gravels | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). |
| | May damage roadside watercourses, riparian vegetation or other significant habitats through the side casting of aggregate<br>Through introduction of non-native soils and vegetation may contribute to the spread of invasive plants | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act* Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7).<br>Ensure gravel sources are weed-free to control noxious weeds (*Weed Control Act*, Weed Control Regulation). |

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Shoulder Maintenance** | May introduce sediment or other deleterious substances to a watercourse through runoff from newly placed or disturbed gravels | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). |
| | May damage roadside watercourses, riparian vegetation or other significant habitats through the side casting of aggregate<br>Through introduction of non-native soils and vegetation may contribute to the spread of invasive plants | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act* Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7). |
| **Road Base Stabilization** | May introduce sediment or other deleterious substances (dust control palliatives) to a watercourse through road base repair | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). |
| | May contaminate surface waters, groundwater, and soils through improper storage or disposal of materials used as dust control palliatives | Reporting of any polluting substance spills (*Environmental Management Act*, Section 79(5)) and disposal of all waste materials in accordance with the *Act* (*Environmental Management Act*, Waste Disposal Regulation). |

## Environmental Best Practices

The following BPs are provided as guidelines to help you ensure your works are completed in compliance with the performance standards and environmental legislation. Please note that the general BPs provided apply for most work activities within this category; if BPs specific to the activity are available they are also noted below.

### Regulatory Agency Contact

- Prior to beginning your gravel surface management activities, identify any sensitive habitat areas, including watercourses—streams, lakes and marine foreshores, found within your work area.
- Determine how much impact your required works will have on the identified areas. Are you placing gravel along a portion of road immediately adjacent to a watercourse? Are you planning shoulder stabilization works beside a lake or fish-bearing watercourse? Where will you place any excess gravel left on site after your re-grading works are complete? By asking these questions, you should be able to identify any planned works that may be of concern to regulatory agencies.
- Meet with the appropriate regulatory agency contact, as listed in Section 8, to discuss site-specific environmental protection measures. Refer to Section 7 for information on the Memorandum of Understanding with MoE, and the recommended protocol for maintaining regular communications with regulatory agencies.

### Timing of Works

For most work activities within this category, the following general BPs apply:

- Works are preferably undertaken during periods of dry weather (e.g., summer) as this allows easier control of sediment. Typically this is also a less sensitive period for fish and wildlife than other seasons.
- If the work schedule requires working in the rain, take steps to ensure that appropriate site isolation and sediment controls are in place. Contain any disturbance you create and prevent the release of sediment-laden water or any other deleterious substances to nearby watercourses.
- If your maintenance activities require work instream (e.g., erosion protection as part of bank shoulder stabilization), you must schedule them to coincide with your region's instream work window. Contact your local MoE and DFO offices for further information on timing windows in your District.

**Working in the Rain**

Some gravel surface management activities are best scheduled after a rainfall, when road aggregate is damp, easier to compact and less likely to generate dust. While a little rain may be helpful, work should be halted if precipitation continues or increases. Under heavy rainfall, disturbed materials are more likely to release sediment and other deleterious substances to nearby watercourses.

### Site Management

- When preparing your worksite and undertaking your maintenance works, minimize vegetation-clearing activities.
- When your works involve the disturbance of soils or the use of erodible materials (e.g., sands, topsoil), prevent the transport of sediment through the installation of appropriate erosion and sediment control BPs and devices.

### Materials Storage

- Use temporary covers to keep erodible construction materials dry if they are stored on site near watercourses.
- Store hazardous materials (surface treatments, dust palliatives) in accordance with applicable regulations and ensure that deleterious substances are handled with care.
- Mix any hazardous materials to be used in a contained area to reduce the risk of contaminating soils or surface waters adjacent to the road surface.
- Clean equipment and tools off-site, if possible. Ensure that any wash water generated by cleaning tools and equipment is managed in a manner that will prevent its release to watercourses or road drains.
- Ensure all equipment used on site is well maintained and free of fluid leaks.

### Waste and Materials Containment

- Have a spill response plan in place and spill kits on site.
- Where possible, sweep up loose material or debris. Any material thought to pose a risk of contamination to soils, surface water or groundwater should be disposed of appropriately off-site. Any clean surplus material

should be removed to an area where it will not enter any watercourse, ditch, or channel.

- Limit the application of surface treatments including dust palliatives to the road surface. Avoid over-spraying near watercourses and at watercourse crossings.
- Inspect sediment controls and wash water runoff areas regularly to ensure they are functioning. Repair as required.
- Consider the potential impacts of side cast materials. Avoid grading materials into roadside watercourses. If excess material is to be disposed of on the highway right of way, designate disposal sites away from sensitive habitats and watercourses. Ensure that materials are placed in a manner that will prevent their future introduction to any watercourse.

## Key Information Sources

The documents and websites listed below are recommended resources for gravel surface management. They can provide examples of existing protocols and management strategies, as well as additional information on specific operational BPs (e.g., erosion and sediment control techniques).

### MoT Technical Circulars:

**Removal of Gravel from MoT Pits by Third Parties** – MoT Technical Circular T-1/91

**Dust Abatement Chemicals** – MoT Technical Circular T-5/94

These and all other MoT Technical Circulars are available at:
http://www.th.gov.bc.ca/Publications/Circulars/Current_technical.asp

### Locally Developed BPs
### (Provide any locally-developed BPs):

-
-
-

### Other Resources:

**Gravel License – Schedule 13 – Current Maintenance Agreement Schedules - Highway Maintenance Contracts.** 2008. BC Ministry of Transportation and Infrastructure.
http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Maintenance_Agreements/SCHEDULE-13_10-Jan-06.pdf

**Catalogue of Stormwater Best Management Practices.** September 2005. Idaho Department of Environmental Quality.
http://www.deq.state.id.us/water/data_reports/storm_water/catalog/index.cfm

**Storm Water Management Fact Sheet – Dust Control.** Sept. 1999. US EPA. http://www.epa.gov/OW-OWM.html/mtb/dustctr.pdf

**Gravel Roads: Maintenance and Design Manual.** Nov. 2000. Skorseth, Ken and Ali A. Selim, Ph.D., P.E., US Environmental Protection Agency. http://www.epa.gov/owow/nps/gravelroads/

**Recommended Practices Manual: A Guideline for Maintenance and Service of Unpaved Roads.** Feb. 2000. Choctawhatchee, Pea and Yellow Rivers Watershed Management Authority. http://www.epa.gov/owow/nps/unpavedroads.html

## Checklist for Environmental Protection Requirements

☐ Is your proposed work considered a "routine" maintenance activity? If not, approvals or permits may be required. Contact your local municipal, provincial, or federal regulatory agency staff.

☐ Has this project been discussed with local environmental regulatory staff? In addition to the BP information presented, other site-specific conditions may apply.

☐ Have site-specific environmental protection requirements been identified? List below:

☐ ________________________________

☐ ________________________________

☐ ________________________________

☐ ________________________________

## 5.3 Dust Management

Dust management activities include the application of dust control products to reduce the creation of airborne particulates (i.e., dust) during the operation and maintenance of unpaved road surfaces and the cleaning of winter aggregate from highway surfaces.

***Highway Maintenance Specification Sections***

| | |
|---|---|
| **1-140** | **Dust Control and Base Stabilization** |
| **1-180** | **Pavement Surface Cleaning** |

**Available at:**

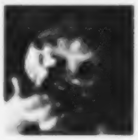
**http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Schedule 21 Maintenance Specifications.pdf**

### Environmental Issues

Primary environmental issues relating to routine dust management activities are summarized in the following table. It should be noted that site-specific conditions might present additional issues you will need to address in planning and undertaking your works.

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Dust Control** | May introduce sediment or other deleterious substances to a watercourse through runoff or by direct application of dust control chemicals to watercourses at crossings | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). |
| | May damage roadside riparian vegetation or other significant habitats through the over-spraying of road shoulders | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7). |
| | May contaminate surface waters, groundwater, and soils through improper storage or disposal of dust control palliatives | Disposal and storage of all waste materials in accordance with the *Act* and reporting of any hazardous materials spills (*Waste Management Act*, Special Wastes Regulation) |

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Pavement Surface Cleaning** | May degrade air quality and highway visibility, posing health and safety problems for highway users and nearby residents | Compliance with local air quality regulations and municipal bylaws |
| | May introduce sediment or other deleterious substances to roadside watercourses through the clearing of materials from the highway surface | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). |
| | May contaminate surface waters, groundwater, and soils through improper storage or disposal of collected accumulated winter aggregate | Reporting of any polluting substance spills (*Environmental Management Act*, Section 79(5)) and disposal of all waste materials in accordance with the *Act* (*Environmental Management Act*, Waste Disposal Regulation). |
| **Winter Traction Materials**<br>*See Section 6.9* | May degrade air quality and highway visibility, particularly in spring, posing health and safety problems for highway users and nearby residents | Compliance with local air quality regulations and municipal bylaws |
| | May introduce sediment or other deleterious substances (i.e., salt, sand, aggregates) to roadside watercourses through runoff or the cleaning of accumulated materials from the highway surface<br>May damage roadside riparian vegetation or other significant habitats through the over-spraying of de-icing compounds | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)).<br>No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)). |
| | May contaminate surface waters, groundwater, and soils when snow banks melt and release accumulated de-icing and anti-icing compounds | Reporting of any polluting substance spills (*Environmental Management Act*, Section 79(5)) and disposal of all waste materials in accordance with the *Act* (*Environmental Management Act*, Waste Disposal Regulation). |



## Environmental Best Practices

The following BPs are provided as guidelines to help you ensure your works are completed in compliance with the performance standards and environmental legislation. Please note that the general BPs provided apply for most work activities within this category; if BPs specific to the activity are available they are also noted below.

### Regulatory Agency Contact

- Prior to beginning your dust control activities identify any sensitive habitat areas, including watercourses—streams, lakes and marine foreshores, found within your work area.
- Determine how much impact your required works will have on the identified areas. What type of equipment are you planning to use to apply dust control measures? Are you applying dust palliatives immediately adjacent to any watercourse? Are you planning to clean accumulated winter aggregate from an area where air quality has been

a concern in the past? By asking these questions, you should be able to identify any planned works that may be of concern to regulatory agencies.

- Meet with the appropriate regulatory agency contact, as listed in Section 8, to discuss site-specific environmental protection measures. Refer to Section 7 for information on the Memorandum of Understanding with MoE and the recommended protocol for maintaining regular communications with regulatory agencies.

### Timing of Works

- As dust palliatives are best applied to a pre-wetted surface, work should be scheduled after a rainfall, when unpaved road surfaces and accumulated aggregate are damp and better able to absorb control measures.
- While damp surfaces are desirable, working in rain is not. Avoid applying dust control palliatives to overly wet or saturated roadbeds. Under heavy rainfall, applied chemicals are more easily transported in runoff to roadside soils and nearby watercourses. Work should be halted if precipitation increases during dust control application.

### Site Management

- Ensure the spray of dust palliatives is limited to the travelled road surface.
- Be cautious of applying dust control chemicals to road surfaces near watercourses or over watercourse crossings.

### Materials Storage

- Store hazardous materials (dust palliatives) in accordance with applicable regulations and ensure that deleterious substances are handled with care.
- Mix any hazardous materials to be used in a contained area to reduce the risk of contaminating soils or surface waters adjacent to the road surface.
- Transfer and load dust control products at a designated site away from watercourses. Take care to avoid spilling chemicals during transfer and loading of applicator tanks.
- Clean equipment and tools off-site, if possible. Ensure that any wash water generated by cleaning tools and equipment is managed in a manner that will prevent its release to watercourses or road drains.
- Ensure all equipment used on site is well maintained and free of fluid leaks.

### Waste and Materials Containment

- Have a spill response plan in place and a functional spill kit on each applicator.
- Do not overspray chemicals used for dust control. Recognized dust control palliatives including magnesium chloride, calcium chloride, calcium lignosulphonate, and sodium lignosulphonate, can seriously impact water quality through long-term use. Materials sprayed can also damage vegetation, soils and wildlife.

## Key Information Sources

The documents and websites listed below are recommended resources for dust management. They can provide examples of existing protocols and management strategies, as well as additional information on specific operational BPs (e.g., erosion and sediment control techniques).

### MoT Technical Circulars:

**Dust Abatement Chemicals** – MoT Technical Circular T-5/94

This and all other MoT Technical Circulars are available at:
http://www.th.gov.bc.ca/Publications/Circulars/Current_technical.asp

### Locally Developed BPs
### (Provide any locally-developed BPs):

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-
-

### Other Resources:

**Fine Particulates: What They Are and How They Affect Us.** Feb. 2007. Environmental Quality Branch. BC Ministry of Environment.
http://www.env.gov.bc.ca/air/particulates/fpwtaaht.html

**Storm Water Management Fact Sheet – Dust Control.** Sept. 1999. US EPA.
http://www.epa.gov/owm/mtb/dustctr.pdf

**Dust Palliative Selection and Application Guide.** Nov. 1999. Bolander, Peter and Alan Yamada. San Dimas Technology and Development Centre.
http://www.ecy.wa.gov/programs/air/pdfs/Dust_Palliative.pdf

**Best Management Practices to Mitigate Road Dust from Winter Traction Materials.** March 2005. BC Ministry of Water, Land and Air Protection.
http://www.env.gov.bc.ca/air/airquality/pdfs/roaddustbmp_june05.pdf

**Roadsalt and Winter Maintenance for British Columbia Municipalities, Best Management Practices to Protect Water Quality.** Dec. 1998. Water, Air and Climate Change Branch, Environmental Protection Division, BC Ministry of Environment.
http://www.env.gov.bc.ca/wat/wq/bmps/roadsalt.html#22

### Checklist for Environmental Protection Requirements

☐ Is your proposed work considered a "routine" maintenance activity? If not, approvals or permits may be required. Contact your local municipal, provincial, or federal regulatory agency staff.

☐ Has this project been discussed with local environmental regulatory staff? In addition to the BP information presented, other site-specific conditions may apply.

☐ Have site-specific environmental protection requirements been identified? List below:

☐ ______________________________

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*Highway Maintenance Specification Sections*

1-190 Debris Removal

Available at:

http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Schedule 21 Maintenance Specifications.pdf

## 5.4 Debris Removal

Debris removal activities include the removal of litter, rubbish, vegetation, fallen rocks, dead animals, spilled materials, brush, branches and other tree parts, or other items that are not part of the highway from the road surface.

### Environmental Issues

Primary environmental issues relating to routine debris removal activities are summarized in the following table. It should be noted that site-specific conditions might present additional issues you will need to address in planning and undertaking your works.

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Rock and Soil Removal** | May introduce sediment or other deleterious substances to a watercourse through removal activities | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). |
| | May damage roadside riparian vegetation or other significant habitats through the side casting of rock or soils | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7). |
| | May damage habitat through the improper location of disposal sites in ditches, wetlands, or other significant habitat areas | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7). |

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Wildlife Carcass Handling and Disposal** | Improper handling of wildlife carcasses may be harmful to human health  Handling of carcasses in accordance with MoT's Advisory for Handling Wildlife Carcasses | May cause a threat to both wildlife and public safety through the attraction of wildlife to highway rights-of-way and storage/disposal locations |
| | May cause a threat to both wildlife and public safety through the attraction of wildlife to highway rights-of-way and storage/disposal locations | Storage and disposal of carcasses in a manner that will not attract dangerous wildlife (*Wildlife Act*, local bylaws) |
| | May pose a threat of disease through improper storage or disposal of roadkill | Disposal and storage of carcasses in accordance with local public health regulations and bylaws |
| | May contaminate surface waters, groundwater, and soils through improper storage or disposal of materials | Disposal of all waste materials in accordance with the *Act* (*Environmental Management Act*, Waste Disposal Regulation) |
| **Abandoned Vehicle Removal** | May contaminate surface waters, groundwater, and soils through disturbance or improper disposal of abandoned vehicles | Reporting of any polluting substance spills (*Environmental Management Act*, Section 79(5)) and disposal of all waste materials in accordance with the *Act* (*Environmental Management Act*, Waste Disposal Regulation) |

## Environmental Best Practices

The following BPs are provided as guidelines to help you ensure your works are completed in compliance with the performance standards and environmental legislation. Please note that the general BPs provided apply for most work activities within this category; if BPs specific to the activity are available they are also noted below.

### Regulatory Agency Contact

- Prior to beginning your debris removal activities, identify any sensitive habitat areas, including wetted ditches and natural watercourses (streams, lakes and marine foreshores), found within your work area that may be of concern to regulatory agencies.
- Meet with the appropriate regulatory agency contact, as listed in Section 8, to discuss site-specific environmental protection measures. Refer to Section 7 for information on the Memorandum of Understanding with MoE, and the recommended protocol for maintaining regular communications with regulatory agencies.
- Local agency staff may also be able to provide options for the appropriate removal and disposal of rock and soil, carcasses, or abandoned vehicles from highway rights-of-way.

### Emergency Works – Rock and Soil Removal

On some occasions, your maintenance activities may be required as part of an emergency response to mass earth movement events such as landslides or bank failures.

Should such work be required, contact your local agency representatives to advise them of your works.

Document the actions you take to ensure you meet debris removal performance standards and legal requirements (i.e., erosion and sediment controls).

### Timing of Works

For most work activities, the following general BPs apply:

- Works are preferably undertaken during periods of dry weather (e.g., summer) as this allows easier control of sediment. Typically this is also a less sensitive period for fish and wildlife than other seasons. If the work schedule requires working in the rain, your area of work must be isolated and appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances.
- If your maintenance activities require work instream, you must schedule them to coincide with your region's instream work window. Contact your local MoE and DFO offices for further information on timing windows in your District.

### Site Management

- If machinery will be working on site, have a spill response plan in place and spill kits on site.
- Ensure equipment used is clean and free of fluid leaks.

### Waste and Materials Management

#### Rock and Soil Removal

- Prevent sediment and other potentially harmful materials from entering into road drains and watercourses during removal activities (this may be accomplished by temporarily blocking road drains or constructing containment berms).
- Remove material to an appropriate storage or disposal site: do not simply flush materials into roadside ditches or side cast debris.
- Ensure removed rock and soil is placed in a location that will prevent the introduction of sediment or other potentially harmful materials to a watercourse.

#### Carcass Handling and Disposal

- Remove carcasses as soon as possible. If carcasses must be stored before disposal, do so in a manner that will not attract animals to the remains, and that will prevent any possible contamination of ground and surface water.
- Do not store or bury carcasses near water bodies, watercourses, or any sources of drinking water.
- Use appropriate personal protective equipment for carcass handling (e.g., gloves). When lifting larger animals, consider the use of mechanical assistance devices (e.g., winches). Refer to MoT's *Advisory for Handling Wildlife Carcasses,* under Other Resources.

### Abandoned Vehicle Removal

- Take care while removing a vehicle to ensure that potentially harmful materials, including vehicle fluids (i.e., gasoline, motor oil), are contained and prevented from contaminating soils and ground and surface waters.
- Have a spill response plan in place and spill kits on site.
- Ensure that the vehicle is transported to an appropriate storage or disposal facility.

## Key Information Sources

The documents and websites listed below are recommended resources for debris removal. They can provide examples of existing protocols and management strategies, as well as additional information on specific operational best management practices (e.g., erosion and sediment control techniques).

### MoT Technical Circulars:

There are no relevant Technical Circulars authored to-date for this activity.

All Technical Circulars are available at:
http://www.th.gov.bc.ca/Publications/Circulars/Current_technical.asp

### Locally Developed BPs
### (Provide any locally-developed BPs):

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-
-

### Other Resources:

**Abandoned Vehicle Process – *Transportation Act.*** Construction and Maintenance Branch. BC Ministry of Transportation
http://www.th.gov.bc.ca/hired-equipment/hiredequip.htm/Abandoned_Vehicle_Process.pdf

**Advisory for Handling Wildlife Carcasses.** 2008. BC Ministry of Transportation and Infrastructure.
http://www.th.gov.bc.ca/publications/eng_publications/environment/references/Advisory_Handling_Wildlife_Carcasses.pdf

## Checklist for Environmental Protection Requirements

☐ Is your proposed work considered a "routine" maintenance activity? If not, approvals or permits may be required. Contact your local municipal, provincial, or federal regulatory agency staff.

☐ Has this project been discussed with local environmental regulatory staff? In addition to the BP information presented, other site-specific conditions may apply.

☐ Have site-specific environmental protection requirements been identified? List below:

☐ ____________________

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## 5.5 Ditch and Watercourse Management

Ditch and watercourse management activities include debris, sediment, and vegetation removal from both natural channels and constructed ditches; repair of bank erosion; and grading and construction of roadside ditches. These activities are undertaken to provide safe, unobstructed drainage for all highway surface runoffs, natural roadside runoffs and ditches; and to create collection areas for debris, ice, and snow.

**Highway Maintenance Specification Sections**

2-250 Ditch and Watercourse Maintenance

Available at:

http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Schedule 21 Maintenance Specifications.pdf

### Environmental Issues

Primary environmental issues relating to routine ditch and watercourse management activities are summarized in the following table. It should be noted that site-specific conditions might present additional issues you will need to address in planning and undertaking your works.

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Debris, Sediment and Vegetation Removal** | May introduce sediment or other deleterious substances to a watercourse through removal activities | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). |
| | May damage roadside riparian vegetation or other significant habitats through the side casting of rock or soils | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7). |
| | May damage habitat through the improper location of disposal sites in ditches, wetlands, or other significant habitat areas | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7).<br>No alteration or destruction of a protected species' residence without approval (*Species at Risk Act*, Sections 32(1), 33). |

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Debris, Sediment and Vegetation Removal** | May disturb wildlife species (e.g., birds, beavers) through vegetation removal or the removal of dam and lodge structures | No disturbance, molestation or destruction of a beaver house or den, unless undertaken to provide irrigation or drainage under lawful authority for the protection of property, or if the action is authorized by regulation (*Wildlife Act*, Section 9)<br>No injury, molestation or destruction of a bird, its egg, and occupied nest, or the nest of an eagle, Peregrine Falcon, Gyrfalcon, Osprey, heron, or Burrowing Owl, unless the species is listed under Schedule C as exempt from this protection (*Wildlife Act*, Section 34).<br>No killing, capturing, injuring, taking or disturbing migratory birds or damaging, destroying, removing or disturbing their nests, unless permitted under the *Act* (*Migratory Birds Convention Act*). |
| | May contribute to the spread of noxious weeds if the removed material is improperly handled and may displace native vegetation | No dispersal of noxious weeds or their seeds (*Weed Control Act*, Weed Control Regulation). |
| **Bank Erosion Repair** | May introduce sediment or other deleterious substances to a watercourse through further disturbances to watercourse banks, types of materials used for repairs, proximity of earthmoving equipment to a watercourse | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). |
| | May damage habitat by altering instream and bank structures and vegetation through the placement of riprap | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7).<br>No spread of invasive plants.<br>No dispersal of noxious weeds or their seeds (*Weed Control Act*, Weed Control Regulation). |
| | May contaminate surface waters, groundwater, and soils through improper storage or disposal of materials | Disposal of all waste materials in accordance with the *Act* and reporting of any hazardous materials spills (*Waste Management Act*, Special Wastes Regulation). |

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Channel Maintenance (grading, construction)** | May introduce sediment or other deleterious substances to a watercourse | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act,* Sections 34(1) and 36(3)). |
| | May damage habitat by altering instream and bank structures and vegetation | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act,* Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act,* Section 9), or through a Notification (*Water Act* Regulation, Part 7).<br>No spread of invasive plants and dispersal of noxious weeds or their seeds (*Weed Control Act,* Weed Control Regulation). |
| | May contaminate surface waters, groundwater, and soils through improper storage or disposal of materials excavated from channels | Disposal of all waste materials in accordance with the *Act* and reporting of any hazardous materials spills (*Waste Management Act,* Special Wastes Regulation) |

## Environmental Best Practices

The following BPs have been compiled for routine maintenance works that do not require a *Water Act* Notification or further approvals from regulatory agencies (i.e., works on non-fish bearing roadside runoffs, ephemeral channels which do not contain fish habitat). Should your works require a *Water Act* Notification or DFO authorization (i.e., works on ditches or watercourses which contain fish and other aquatic species or fish habitat), you will be provided with more detailed BPs by the regulatory agencies in response to your application.

The BPs provided in this document are provided as guidelines to help you ensure your works are completed in compliance with the performance standards and environmental legislation. Please note that the general BPs apply for most work activities within this category; if BPs specific to the activity are available they are also noted below.

### Regulatory Agency Contact

- Prior to beginning your ditch and watercourse management activities, identify any sensitive habitat areas, including wetted ditches and natural watercourses—streams, lakes and marine foreshores, found within your work area.
- Determine how much impact your required works will have on the identified areas. Are you planning to re-grade a non-vegetated roadside drainage ditch that only conveys storm water? Are you required to remove debris jams from a permanently wetted fish-bearing watercourse that crosses the highway right-of-way? What type of equipment and materials are you planning to use to stabilize a large lakeside section of

### Assessing Potential Risks

Watercourses can generally be divided into the following three classes based on their habitat value and the level of protection they require:

1. Any fish-bearing wetted channel
2. Any wetted channel where fish may not be present yet which provides food, nutrients, or cool water to downstream watercourses and habitat for other aquatic species
3. Any non-fish-bearing channel which dries after rainfall and provides insignificant food, nutrient or habitat value

Consider what type of watercourse you will be working in when assessing the level of regulatory agency contact your works will require.

**If you are planning work in or around watercourses that provide direct or indirect fish habitat, contact MoE and DFO.**

highway embankment that has been damaged by erosion? Are there any areas within your jurisdiction prone to regular debris accumulations or erosion issues? By asking these questions, you should be able to identify any planned works or areas that may be of concern to regulatory agencies.

- Meet with the appropriate regulatory agency contact, as listed in Section 8, to discuss site-specific environmental protection measures. Refer to Section 7 for information on the Memorandum of Understanding with MoE, and the recommended protocol for maintaining regular communications with regulatory agencies.

### Timing of Works

For most work activities within this category, the following general BPs apply:

- Works are preferably undertaken during periods of dry weather (e.g., summer) as this allows easier control of sediment. Typically this is also a less sensitive period for fish and wildlife than other seasons. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances.
- If your maintenance activities require work instream, you must schedule them to coincide with your region's instream work window. Contact your local MoE and DFO offices for further information on timing windows in your District.

#### Emergency Debris Removal

- If there is a demonstrable risk posed to highway stability and safety by debris or other materials limiting drainage within or across the highway right-of-way during a flood event, it is appropriate for you to undertake works to reduce the flood threat as soon as possible. Where possible, notify your local MoE Habitat Officers and DFO Habitat Management staff before beginning your debris removal works or as soon as you are able. Limit your work to only that which is required to reduce the threat to the highway and associated structures. Take steps to minimize your impact to watercourse structures and vegetation and ensure that appropriate measures (e.g., erosion and sediment control, re-vegetation) are in place to mitigate any impacts resulting from your work.

### Site Management

- Minimize disturbance to areas surrounding the worksite and avoid impacts to surrounding trees and shrubs when preparing your worksite and undertaking your maintenance works. To assist with bank stability leave topsoil and root systems intact on upper portions of cleaned channel banks and above areas where riprap is placed.

### Beaver and Beaver Dam Management

If your works require you to modify or remove a beaver dam, you will require a permit for the works under the *Wildlife Act* Regulations. Contact your local Conservation Officer for assistance. Permit applications may be submitted online through MoE's Permit and Authorization Service Bureau (http://www.env.gov.bc.ca/pasb/

Best Management Practices for beaver dam modifications and removals may be found in the *MoE Standards and Best Practices for Instream Works* document, accessible online at http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf

### Equipment Use

- Select appropriate equipment and work access routes to reduce damage to riparian vegetation and watercourse banks when using earth. If removing debris from a watercourse, operate equipment from the bank or road shoulder. Do not allow machinery to cross through water.
- Ensure all equipment used on site is well maintained and free of fluid leaks. Refuel and lubricate equipment on dry land away from watercourses. Use drip trays to contain any spillage during equipment maintenance.

### Worksite Isolation

- Isolate your work area from any flowing water that may be present. Ensure any flows are temporarily diverted around the portion of the ditch or watercourse where you are working.
- Contain any sediment-laden water generated during your works in an isolated work cell. Use a pump to draw sediment-laden water out of the work cell and discharge it to a level vegetated area where sediment can settle as the water infiltrates the ground.

### Erosion and Sediment Control

- Use clean materials, free of fine soils that may contribute sediment to the watercourse, when installing riprap or other bank erosion protection measures.
- If excavated materials or any other erodible materials are to be left on site, ensure they are placed in a manner that will prevent the introduction of sediment to any watercourse (i.e., temporary covers, grading and seeding, installation of silt fence around spoil piles).
- Install appropriate erosion and sediment control devices (e.g., silt fence installed below disturbed slopes, rock check dams and temporary silt dikes in low velocity, low volume ditches) to prevent the movement of sediment to downstream watercourses. Ensure that any structures installed are maintained and monitored until they are no longer needed (i.e., vegetative cover on seeded areas is adequate to control erosion).

### Ditch and Watercourse Maintenance

- Do not dump ditch waste above or below the ditch where desirable vegetation is established. Instead, dispose of waste materials at a designated disposal site. Record and report the source location of the disposed waste or spill materials.
- Minimize soil exposure and removal of desirable vegetation to prevent establishment of invasive plants.

### DFO Operational Statement – Maintenance of Riparian Vegetation in Existing Rights-of-Way

DFO has developed a series of "Operational Statements" (OS) to streamline the regulatory review of low risk activities completed in and around water. Each OS outlines measures and conditions that must be implemented to be compliant with Subsection 35(1) of the *Fisheries Act* (i.e., no harmful alteration, disruption and destruction (HADD) of fish habitat).

There is an OS for Maintenance of Riparian Vegetation in Existing Rights-of-Way which you can access at: (http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/operational_statements_e.htm)

## Key Information Sources

The documents and websites listed below are recommended resources for ditch and watercourse management. They can provide examples of existing protocols and management strategies, as well as additional information on specific operational BPs (e.g., erosion and sediment control techniques).

### MoT Technical Circulars:

There are no relevant Technical Circulars authored to-date for this activity.

All Technical Circulars are available at:
http://www.th.gov.bc.ca/Publications/Circulars/Current_technical.asp

### Locally Developed BPs (Provide any locally-developed BPs):

- *Riprap - Skeena BMPs for Road Maintenance.* 2003. MoT. http://www.th.gov.bc.ca/publications/eng_publications/best_practices/bp.pdf
- *Ditching - Skeena BMPs for Road Maintenance.* 2003. MoT. http://www.th.gov.bc.ca/publications/eng_publications/best_practices/bp.pdf

### Other Resources:

**Standards and Best Practices For Instream Works.** March 2004. BC Ministry of Water, Land and Air Protection.
http://www.env.gov.bc.ca./wld/documents/bmp/iswstdsbpsmarch2004.pdf

**Maintenance of Riparian Vegetation in Existing Rights-of-Way** – Pacific Regional Operational Statement. 2008. Fisheries and Oceans Canada (DFO).
http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/os-riparian_veg_maint_e.htm

**General Best Management Practices to Protect Water Quality website.** June 2004. Environmental Protection Division, BC Ministry of Environment.
http://www.env.gov.bc.ca/wat/wq/nps/BMP_Compendium/nps_bmp.htm

**Catalogue of Stormwater Best Management Practices.** September 2005. Idaho Department of Environmental Quality.
http://www.deq.state.id.us/water/data_reports/storm_water/catalog/index.cfm

**Manual of Control of Erosion and Shallow Slope Movement.** August 1997. BC Ministry of Transportation.
http://www.th.gov.bc.ca/Publications/eng_publications/environment/references/Man_Control_Erosion.pdf

**T.I.P.S.: Targeted Invasive Plant Solutions.** Invasive Plant Council of British Columbia. 2007.
http://www.invasiveplantcouncilbc.ca/resources/targeted-invasive-plant-solutions-tips

**Agricultural Watercourse Maintenance – Lower Fraser Valley and Vancouver Island.** Undated Brochure. BC Ministry of Agriculture, Food, and Fisheries and Ministry of Environment, Lands and Parks.
http://www.al.gov.bc.ca/resmgmt/ditchpol/brochure/AgDitchMtceBrochure.pdf

## Checklist for Environmental Protection Requirements

☐ Is your proposed work considered a "routine" maintenance activity? If not, approvals or permits may be required. Contact your local municipal, provincial, or federal regulatory agency staff.

☐ Has this project been discussed with local environmental regulatory staff? In addition to the BP information presented, other site-specific conditions may apply.

☐ Have site-specific environmental protection requirements been identified? List below:

☐ ______________________________

☐ ______________________________

☐ ______________________________

☐ ______________________________

***Highway Maintenance Specification Sections***

2.260 Drainage Appliance Maintenance

Available at:

http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Schedule 21 Maintenance Specifications.pdf

## 5.6 Drainage Appliance Management

Drainage appliance management activities are undertaken to ensure that highway surfaces are safe and efficiently drained, water is efficiently channeled to ditches and watercourses, and erosion of highways and adjacent properties is prevented. They include the cleaning and maintenance of drainage appliances and related hardware, as well as the replacement of existing and installation of new drainage appliances.

### Environmental Issues

Primary environmental issues relating to routine drainage appliance management activities are summarized in the following table. It should be noted that site-specific conditions might present additional issues you will need to address in planning and undertaking your works.

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Debris and Sediment Removal** | May introduce sediment or other deleterious substances (de-icing compounds in accumulated winter aggregate, heated water used to clear ice blocks from drainage appliance) to a watercourse through removal activities | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). Deleterious substances include, but are not limited to, gasoline, oils, sediment, de-icing compounds and chlorinated water. |
| | May damage roadside riparian vegetation or other significant habitats through the side casting of rock or soils | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7). |
| | May damage habitat through the improper location of disposal sites in ditches, wetlands, or other significant habitat areas | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7). |

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Repair Works** | May release deleterious substances (sediment, cement-based products, epoxies, sealants) to a watercourse | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act,* Sections 34(1) and 36(3)). Deleterious substances include, but are not limited to, gasoline, oils, paints, sealants, concrete leachate, and sediment. |
|  | May contaminate surface waters, groundwater, and soils through improper storage or disposal of materials | Reporting of any polluting substance spills (*Environmental Management Act,* Section 79(5)) and disposal of all waste materials in accordance with the *Act* (*Environmental Management Act,* Waste Disposal Regulation). |
| **Installation of New Drainage Appliances** | May damage habitat by altering instream and bank structures and vegetation through construction and installation activities | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act,* Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act,* Section 9), or through a Notification (*Water Act* Regulation, Part 7). |
|  | May damage habitat through the enclosure of an existing open channel, should the drainage appliance be located on a roadside channel containing fish habitat | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act,* Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act,* Section 9), or through a Notification (*Water Act* Regulation, Part 7). |
|  | May release deleterious substances (sediment, cement-based products, epoxies, sealants) to a watercourse | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act,* Sections 34(1) and 36(3)). Deleterious substances include, but are not limited to, gasoline, oils, paints, cleaners, concrete leachate, and sediment. |
| **Placement of Scour Protection (Riprap)** | May damage habitat by altering instream and bank structures and vegetation through the placement of riprap | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act,* Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act,* Section 9), or through a Notification (*Water Act* Regulation, Part 7). |
|  | May introduce sediment or other deleterious substances to a watercourse through bank disturbance or the placement of rock material contaminated with fine sediment | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act,* Sections 34(1) and 36(3)). |

## Environmental Best Practices

The following BPs have been compiled for routine maintenance works that do not require a *Water Act* Notification or further approvals from regulatory agencies (i.e., works on non-fish bearing roadside runoffs, ephemeral channels which do not contain fish habitat). Should your works require a *Water Act* Notification or DFO authorization (i.e., works on ditches or watercourses which contain fish and other aquatic species or fish habitat), you will be provided with more detailed BPs by the regulatory agencies in response to your application.

The BPs in this document are provided as guidelines to help you ensure your works are completed in compliance with the performance standards and environmental legislation. Please note that the general BPs apply for most work activities within this category; if BPs specific to the activity are available they are also noted below.

### Assessing Potential Risks

Watercourses can generally be divided into the following three classes based on their habitat value and the level of protection they require:

1. Any fish-bearing wetted channel
2. Any wetted channel where fish may not be present yet which provides food, nutrients, or cool water to downstream watercourses and habitat for other aquatic species
3. Any non-fish-bearing channel which dries after rainfall and provides insignificant food, nutrient or habitat value

Consider what type of watercourse you will be working in when assessing the level of regulatory agency contact your works will require.

**If you are planning work in or around watercourses that provide direct or indirect fish habitat, contact MoE and DFO.**

### Regulatory Agency Contact

- Prior to beginning your drainage appliance management activities, identify any sensitive habitat areas, including wetted ditches and natural watercourses—streams, lakes and marine foreshores, found within your work area.
- Determine how much impact your required works will have on the identified areas. Are you planning to replace a small diameter culvert that conveys storm water to a non-vegetated roadside drainage ditch? Are you required to remove debris jams from a culvert on a permanently wetted fish-bearing watercourse that crosses the highway right-of-way? What type of equipment and materials are you planning to use to stabilize a large lakeside section of highway embankment that has been damaged by erosion? Are there any areas within your jurisdiction prone to regular debris accumulations or erosion issues? By asking these questions, you should be able to identify any planned works or areas that may be of concern to regulatory agencies.
- Meet with the appropriate regulatory agency contact, as listed in Section 8, to discuss site-specific environmental protection measures. Refer to Section 7 for information on the Memorandum of Understanding with MoE, and the recommended protocol for maintaining regular communications with regulatory agencies.

### Timing of Works

For most work activities within this category, the following general BPs apply:

- Works are preferably undertaken during periods of dry weather (e.g., summer) as this allows easier control of sediment. Typically this is also a less sensitive period for fish and wildlife than other seasons. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances.

- If your maintenance activities require work instream, you must schedule them to coincide with your region's instream work window. Contact your local MoE and DFO offices for further information on timing windows in your District.

**Important Note:**

The *Water Act* (Section 44 (1)(p)) permits MoT to remove obstructions, including beaver dams, as an **emergency** measure if the dams are obstructing bridges or road culverts during flood conditions. However, DFO may view dam removal as causing a harmful alteration, disruption, or destruction (or "HADD") of fish habitat and require you to obtain an authorization for your works under Section 35 (2) of the *Fisheries Act* prior to undertaking the works.

For information on emergency works and application submission requirements, contact your local MoE Habitat Officers or review *MoE's Standards and Best Practices for Instream Works* document at http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf

### Emergency Debris Removal

- If there is a demonstrable risk posed to highway stability and safety by debris or other materials limiting drainage within or across the highway right-of-way during a flood event, it is appropriate for you to undertake works to reduce the flood threat as soon as possible. Where possible, notify your local MoE Habitat Officers and DFO Habitat Management staff before beginning your debris removal works or as soon as you are able. Limit your work to only that which is required to reduce the threat to the highway and associated structures. Take steps to minimize your impact to watercourse structures and vegetation and ensure that appropriate measures (e.g., erosion and sediment control, re-vegetation) are in place to mitigate any impacts resulting from your work.

### Site Management

- Minimize disturbance to areas surrounding the worksite and avoid impacts to surrounding trees and shrubs when preparing your worksite and undertaking your maintenance works. To assist with bank stability and invasive plant prevention, leave topsoil and root systems intact on channel banks surrounding your work area.

- Apply native grass and ground cover seed mixes to exposed soils to reduce the risk of invasive plant establishment.

- Ensure any works to repair damaged appliances retain the pre-repair channel conditions (e.g., streambed profile, substrate, channel cross-section) and do not constrict the stream width.

### Equipment Use

- Select appropriate equipment and work access routes to reduce damage to riparian vegetation and watercourse banks when using earth-moving equipment.
- For smaller scale debris and sediment removal activities, remove materials by hand.
- If working near a watercourse, operate equipment from the bank or road shoulder. Do not allow machinery to cross through water.
- Ensure all equipment used on site is well maintained and free of fluid leaks. Refuel and lubricate equipment on dry land away from watercourses. Use drip trays to contain any spillage during maintenance.

### Worksite Isolation

- Isolate your work area from any flowing water that may be present. Ensure any flows are temporarily diverted around the portion of the ditch or watercourse where you are working.
- If potentially deleterious materials (e.g., cement-based products) are used for repair works, ensure raw material and wash water will not be released to any watercourse.
- Contain any sediment-laden water generated during your works in your isolated work cell. Use a pump to draw sediment-laden water out of the work cell and discharge it to a level vegetated area where sediment can settle as the water infiltrates the ground.

### Waste and Materials Management

- Have a spill response plan in place and spill kits on site.
- Clean equipment and tools off-site, if possible. Ensure that any wash water generated by cleaning tools and equipment is managed in a manner that will prevent its release to watercourses or road drains.
- Where possible, sweep up loose material or debris. Any material thought to pose a risk of contamination to soils, surface water or groundwater should be disposed of appropriately off-site. Any clean surplus material should be removed to an area where it will not enter any watercourse, ditch, or channel.
- Dispose of excess materials, excavated soils, and removed debris away from any watercourse. Ensure that the material is placed in such a manner as to prevent its future introduction into any watercourse by installing silt fencing, seeding, or using similar sediment control BPs.

#### Debris Removal

- If excavated materials or any other erodible materials are to be left on site, ensure they are placed in a manner that will prevent the introduction of sediment to any watercourse (i.e., temporary covers, grading and seeding, installation of silt fence around spoil piles).

### Beaver and Beaver Management

If your works require you to modify or remove a beaver dam, you will require a permit for the works under the *Wildlife Act* Regulations. Contact your local Conservation Officer for assistance. Permit applications may be submitted online through MoE's Permit and Authorization Service Bureau (http://www.env.gov.bc.ca/pasb/)

Best Management Practices for beaver dam modifications and removals may be found in the MoE Standards and Best Practices for Instream Works document, accessible online at

http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf

### Repair Works

- Store any hazardous materials use (chemicals, sealants, patching materials) in accordance with applicable regulations and ensure that deleterious substances are handled with care.
- Mix concrete compounds, sealants or other chemicals used in a contained area and away from any watercourse if there is the potential for materials used in your work to contact soils or surface waters adjacent to the road surface.

### Erosion and sediment control

- Install appropriate erosion and sediment control devices (e.g., silt fence installed below disturbed slopes, rock check dams and temporary silt dikes in low velocity, low volume ditches) to prevent the transportation of sediment to downstream watercourses. Ensure that any structures installed are maintained and monitored until they are no longer needed (i.e., vegetative cover on seeded areas is adequate to control erosion).
- Use clean materials, free of fine soils that may contribute sediment to the watercourse, when installing rock or other scour protection measures.

## Key Information Sources

The documents and websites listed below are recommended resources for drainage appliance management. They can provide examples of existing protocols and management strategies, as well as additional information on specific operational BPs (e.g., erosion and sediment control techniques).

### MoT Technical Circulars:

There are no relevant Technical Circulars authored to-date for this activity.

All Technical Circulars are available at:
http://www.th.gov.bc.ca/Publications/Circulars/Current_technical.asp

### Locally Developed BPs (Provide any locally-developed BPs):

- *Riprap – Skeena BMPs for Road Maintenance.* 2003. MoT. http://www.th.gov.bc.ca/publications/eng_publications/best_practices/bp.pdf

### Other Resources:

**Standards and Best Practices For Instream Works.** March 2004. BC Ministry of Water, Land and Air Protection. http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf

**Culvert Maintenance – Pacific Region Operational Statement.** 2008. Fisheries and Oceans Canada (DFO). http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/os-culvert_maint_e.htm

**Culverts and Fish Passage Fact Sheet.** Oct. 2000. Environmental Management Section, Engineering Branch. BC Ministry of Transportation. http://www.th.gov.bc.ca/publications/eng_publications/environment/references/Culverts_and_Fish_Passage.pdf

**Fish Stream Crossing Guidebook.** 2002. Forest Practices Branch, BC Ministry of Forests.
http://www.for.gov.bc.ca/tasb/legsregs/fpc/FPCGUIDE/FishStreamCrossing/FSCGdBk.pdf

**General Best Management Practices to Protect Water Quality website.** June 2004. Environmental Protection Division, BC Ministry of Environment.
http://www.env.gov.bc.ca/wat/wq/nps/BMP_Compendium/nps_bmp.htm

**Manual of Control of Erosion and Shallow Slope Movement.** August 1997. BC Ministry of Transportation.
http://www.th.gov.bc.ca/Publications/eng_publications/environment/references/Man_Control_Erosion.pdf

**T.I.P.S.: Targeted Invasive Plant Solutions.** Invasive Plant Council of British Columbia. 2008.
http://www.invasiveplantcouncilbc.ca/resources/targeted-invasive-plant-solutions-tips

**Catalogue of Stormwater Best Management Practices.** September 2005. Idaho Department of Environmental Quality.
http://www.deq.state.id.us/water/data_reports/storm_water/catalog/index.cfm

**Application of Best Management Practices to Erosion and Sediment Control on Alberta Highways.** Alberta Transportation.
http://www.transportation.alberta.ca/Content/docType372/Production/erogoodbad.pdf

## Checklist for Environmental Protection Requirements

☐ Is your proposed work considered a "routine" maintenance activity? If not, approvals or permits may be required. Contact your local municipal, provincial, or federal regulatory agency staff.

☐ Has this project been discussed with local environmental regulatory staff? In addition to the BP information presented, other site-specific conditions may apply.

☐ Have site-specific environmental protection requirements been identified? List below:

☐ ____________________

☐ ____________________

☐ ____________________

☐ ____________________

## 5.7 Shore, Bank, and Watercourse Management

*Highway Maintenance Specification Sections*

2.260 Drainage Appliance Maintenance

Available at:

http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Schedule 21 Maintenance Specifications.pdf

To protect highway safety and stability, shore, bank and watercourse management activities include the removal of obstructions, beaver dams, and debris from natural and man-made shores, banks, and watercourses and the placement of riprap for bank protection.

### Environmental Issues

Primary environmental issues relating to routine shore, bank and watercourse management activities are summarized in the following table. It should be noted that site-specific conditions might present additional issues you will need to address in planning and undertaking your works.

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Obstruction, Beaver Dam, and Debris Removal** | May introduce sediment or other deleterious substances to a watercourse through removal activities | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). Deleterious substances include, but are not limited to, gasoline, oils and sediment. |
| | May damage riparian vegetation or disturb wildlife through the removal of trees adjacent to watercourses | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No injury, molestation or destruction of a bird, its egg, and occupied nest, or the nest of an eagle, Peregrine Falcon, Gyrfalcon, Osprey, heron, or Burrowing Owl, unless the species is listed under Schedule C as exempt from this protection (*Wildlife Act*, Section 34).<br>No killing, capturing, injuring, taking or disturbing migratory birds or damaging, destroying, removing or disturbing their nests, unless permitted under the *Act* (*Migratory Birds Convention Act*) |

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Obstruction, Beaver Dam, and Debris Removal** | May damage fish and wildlife habitat through removal of beaver dams | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1))<br>No disturbance, molestation or destruction of a beaver house or den, unless undertaken to provide irrigation or drainage under lawful authority for the protection of property, or if the action is authorized by regulation (*Wildlife Act*, Section 9). In these circumstances, specific restrictions including the requirement for landowner approval apply |
| **Bank Protection (Riprap)** | May harmfully alter shorelines and channel banks through the placement of riprap materials No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)). | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7) |
| | May introduce sediment or other deleterious substances to a watercourse through site preparation for riprap placement or the placement of silt-laden or acid-rock riprap materials | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). Deleterious substances include, but are not limited to, gasoline, oils, sediment, and acid-rock leachate |

## Environmental Best Practices

The following BPs have been compiled for routine maintenance works that do not require a *Water Act* Notification or further approvals from regulatory agencies (i.e., works on non-fish bearing roadside runoffs, ephemeral channels which do not contain fish habitat). Should your works require a *Water Act* Notification or DFO authorization (i.e., works on ditches or watercourses which contain fish and other aquatic species or fish habitat), more detailed BPs will be provided to you by the regulatory agency in response to your application.

The BPs provided in this document are provided as guidelines to help you ensure your works are completed in compliance with the performance standards and environmental legislation. Please note that the general BPs apply for most work activities within this category; if BPs specific to the activity are available they are also noted below.

### Regulatory Agency Contact

- Prior to beginning your planned shore, bank and watercourse management activities, identify any sensitive habitat areas including wetted ditches and natural watercourses—streams, lakes and marine foreshores—found within your work area.

- Determine how much impact your required works will have on the identified areas. Are you planning to install riprap along a bank on a non-vegetated roadside drainage ditch that only conveys storm water or a large area of marine foreshore? Are you required to remove trees from riparian areas to prevent future blockages? Will you be impacting areas of vegetation along a lakeshore as a result of your riprap placement? Are there any areas within your jurisdiction prone to regular debris accumulations or erosion issues? By asking these questions, you should be able to identify any planned works or areas that may be of concern to regulatory agencies.
- Meet with the appropriate regulatory agency contact, as listed in Section 8, to discuss site-specific environmental protection measures. Refer to Section 7 for information on the Memorandum of Understanding with MoE, and the recommended protocol for maintaining regular communications with regulatory agencies.

### Assessing Potential Risks

Watercourses can generally be divided into the following three classes based on their habitat value and the level of protection they require:

1. Any fish-bearing wetted channel
2. Any wetted channel where fish may not be present yet which provides food, nutrients, or cool water to downstream watercourses and habitat for other aquatic species
3. Any non-fish-bearing channel which dries after rainfall and provides insignificant food, nutrient or habitat value

Consider what type of watercourse you will be working in when assessing the level of regulatory agency contact your works will require.

**If you are planning work in or around watercourses that provide direct or indirect fish habitat, contact MoE and DFO.**

### Timing of Works

For most work activities within this category, the following general BPs apply:

- Works are preferably undertaken during periods of dry weather (e.g., summer) as this allows easier control of sediment. Typically this is also a less sensitive period for fish and wildlife than other seasons. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances.
- If your maintenance activities require work instream, you must schedule them to coincide with your region's instream work window. Contact your local MoE and DFO offices for further information on timing windows in your District.

#### Emergency Debris Removal or Erosion Protection Works

- If there is a demonstrable risk posed to highway stability and safety by debris or other materials limiting drainage within or across the highway right-of-way during a flood event, it is appropriate for you to undertake works to reduce the flood threat as soon as possible. Where possible, notify your local MoE Habitat Officers and DFO Habitat Management staff before beginning your debris removal works or as soon as you are able. Limit your work to only that which is required to reduce the threat to the highway and associated structures. Take steps to minimize your impact to watercourse structures and vegetation and ensure that appropriate measures (e.g., erosion and sediment control, re-vegetation) are in place to mitigate any impacts resulting from your work.

**Important Note:**

The *Water Act* (Section 44 (1)(p)) permits MoT to remove obstructions as an emergency measure if the dams are obstructing bridges or road culverts during flood conditions. The *Water Act* (Section 44 (1)(o)) also permits the construction or placement of erosion protection works or flood protection works during a **flood emergency.** However, DFO may view dam removal works or riprap placement as causing a harmful alteration, disruption, or destruction (or "HADD") of fish habitat and require you to obtain an authorization for your works under Section 35 (2) of the *Fisheries Act* prior to undertaking the works.

For information on emergency works and application submission requirements, contact your local DFO Habitat Management staff and MoE Habitat Officers or review *MoE's Standards and Best Practices for Instream Works* document at: http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf

### Site Management

- Minimize disturbance to areas surrounding the worksite. Avoid impacts to surrounding trees and shrubs when preparing your worksite and undertaking your maintenance works. To assist with bank stability and invasive plant prevention, leave topsoil and root systems intact within your work area.
- Ensure any riprap works to armour eroding banks or shores retain the pre-work channel or shore conditions (e.g., streambed profile, substrate, channel cross-section) as much as possible and do not constrict the stream width.
- Apply native grass and ground cover seed mixes to exposed soils to reduce the risk of invasive plant establishment.

#### Beaver Dam and Debris Obstruction Removal

- Remove the dam or obstruction in a controlled manner. Notch the centre of the structure and allow the level of water impounded behind the obstruction to slowly drop.
- Allow water levels on both sides of the obstruction to stabilize before the next level drop; this helps to minimize silt release and reduces the risk of erosion to downstream banks.
- Consider the placement of sediment control measures (i.e., floating silt curtain) downstream to minimize the risk of sediment discharge to downstream areas during obstruction removal.

#### Tree Removal

- Only remove trees that pose a significant risk of impacting drainage within the highway right-of-way. Vegetation within riparian areas

**DFO Operational Statements:**

**- Aquatic Vegetation Removal in Lakes**

**- Maintenance of Riparian Vegetation in Existing Rights-of-Way**

DFO has developed a series of "Operational Statements" (OS) to streamline the regulatory review of low risk activities completed in and around water. Each OS outlines measures and conditions that must be implemented to be compliant with Subsection 35(1) of the *Fisheries Act* (i.e., no harmful alteration, disruption and destruction (HADD) of fish habitat).

There are OSs for Aquatic Vegetation Removal in Lakes and Maintenance of Riparian Vegetation in Existing Rights-of-Way which you can access at: (http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/operational_statements_e.htm) plays a significant role in maintaining bank stability, water quality, and habitat value. Unnecessary impacts to it should be avoided.

- Ensure that no bird or wildlife species are currently occupying the tree and that the tree does not contain a protected nest.
- If possible, limit your removal activities to topping the tree. Leave the stump and root mass in place.
- If the site conditions permit, buck the cut portion of the tree and leave on site, above the high water mark in a manner that will prevent its future movement into the watercourse.

### Equipment Use

- Select appropriate equipment and work access routes to reduce damage to riparian vegetation and watercourse banks.
- For smaller scale debris and sediment removal activities, remove materials by hand.
- When working near watercourses, operate equipment from the bank or road shoulder. Do not allow machinery to cross through water.
- Ensure all equipment used on site is well maintained and free of fluid leaks. Refuel and lubricate equipment on dry land away from watercourses. Use drip trays to contain any spillage during equipment maintenance.

### Worksite Isolation

- Isolate your work area from any flowing water that may be present. Ensure any flows are temporarily diverted around the portion of the ditch or watercourse where you are working.
- Contain any sediment-laden water generated during your works in your isolated work cell. Use a pump to draw sediment-laden water out of the work cell and discharge it to a level vegetated area where sediment can settle as the water infiltrates the ground.

### Waste and Materials Containment

- If machinery will be working on site, have a spill response plan in place and spill kits on site.
- Clean equipment and tools off-site, if possible. Ensure that any wash water generated by cleaning tools and equipment is managed in a manner that will prevent its release to watercourses or road drains.
- Dispose of excess materials, excavated soils, and removed debris away from any watercourse. Ensure that the material is placed in such a manner as to prevent its future introduction into any watercourse by installing silt fencing, seeding, or using similar sediment control BPs.

### Erosion and sediment control

- If excavated materials or any other erodible materials are to be left on site, ensure they are placed in a manner that will prevent the introduction of sediment to any watercourse (i.e., temporary covers, grading and seeding, installation of silt fence around spoil piles).
- Install appropriate erosion and sediment control devices (e.g., silt fence installed below disturbed slopes, rock check dams and temporary silt dikes in low velocity, low volume ditches) to prevent the movement of sediment to downstream watercourses. Ensure that any structures installed are maintained and monitored until they are no longer needed (i.e., vegetative cover on seeded areas is adequate to control erosion).
- Use clean materials, free of fine soils that may contribute sediment to the watercourse, when installing riprap or other shore or bank protection measures.

### Ditch and Watercourse Maintenance

- Do not dump ditch waste above or below the ditch where desirable vegetation is established. Instead, dispose of waste materials at a designated disposal site. Record and report the source location of the disposed waste or spill materials.
- Minimize soil exposure and removal of desirable vegetation to prevent the establishment of invasive plants.

## Key Information Sources

The documents and websites listed below are recommended resources for shore, bank and watercourse management. They can provide examples of existing protocols and management strategies, as well as additional information on specific operational BPs (e.g., erosion and sediment control techniques).

### MoT Technical Circulars:

There are no relevant Technical Circulars authored to-date for this activity.

All Technical Circulars are available at:
http://www.th.gov.bc.ca/Publications/Circulars/Current_technical.asp

### Locally Developed BPs
### (Provide with any locally-developed BPs):

- *Riprap – Skeena BMPs for Road Maintenance.* 2003. MoT. http://www.th.gov.bc.ca/publications/eng_publications/best_practices/bp.pdf
- *Removal of Beaver Dams from Culverts at Pre-approved Locations.* 2003. Skeena BMPs for Road Maintenance. MoT. http://www.th.gov.bc.ca/publications/eng_publications/best_practices/bp.pdf

### Other Resources

**Standards and Best Practices for Instream Works.** March 2004. Ministry of Water, Land and Air Protection. http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf

**Maintenance of Riparian Vegetation in Existing Rights-of-Way – Pacific Region Operational Statement.** 2008. Fisheries and Oceans Canada (DFO). http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/os-riparian_veg_maint_e.htm

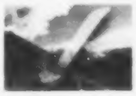
**Aquatic Vegetation Removal in Lakes – Pacific Region Operational Statement.** 2008. Fisheries and Oceans Canada (DFO). http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/os-aquatic_veg_e.htm

**General Best Management Practices to Protect Water Quality website.** June 2004. Environmental Protection Division, Ministry of Environment. http://www.env.gov.bc.ca/wat/wq/nps/BMP_Compendium/nps_bmp.htm

**Manual of Control of Erosion and Shallow Slope Movement.** August 1997. BC Ministry of Transportation. http://www.th.gov.bc.ca/Publications/eng_publications/environment/references/Man_Control_Erosion.pdf

**Catalogue of Stormwater Best Management Practices.** September 2005. Idaho Department of Environmental Qualityhttp://www.deq.state.id.us/water/data_reports/storm_water/catalog/index.cfm

**Beaver Management Guidelines.** 2001. Ministry of Water, Land and Air Protection. Vancouver Island Region. http://wlapwww.gov.bc.ca/vir/pa/Beaver-Guide.pdf



## Checklist for Environmental Protection Requirements

☐ Is your proposed work considered a "routine" maintenance activity? If not, approvals or permits may be required. Contact your local municipal, provincial, or federal regulatory agency staff.

☐ Has this project been discussed with local environmental regulatory staff? In addition to the BP information presented, other site-specific conditions may apply.

☐ Have site-specific environmental protection requirements been identified? List below:

☐ ____________________

☐ ____________________

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☐ ____________________

*Highway Maintenance Specification Sections*

**2.280 Engineered Wetland and Water Quality Pond Maintenance**

Available at:

http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Schedule 21 Maintenance Specifications.pdf

## 5.8 Engineered Wetland and Water Quality Pond Management

Engineered wetland and water quality pond management activities include the hand and machine removal of debris from pond inlets and outlets and the repair and replacement of drainage appliances to allow settling of suspended sediments from road runoff and filtering of road runoff prior to discharge downstream.

### Environmental Issues

Primary environmental issues relating to routine engineered wetland and water quality pond management activities are summarized in the following table. It should be noted that site-specific conditions might present additional issues you will need to address in planning and undertaking your works.

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Cleaning and Debris Removal** | May introduce sediment or other deleterious substances to a watercourse through sediment and debris removal activities | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). |
| | May damage roadside riparian vegetation or other significant habitats through the side casting of accumulated sediment | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7). |
| | May damage habitat through the improper location of sediment and debris disposal sites in ditches, wetlands, or other significant habitat areas | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7).<br>No alteration or destruction of a protected species' residence without approval (*Species at Risk Act*, Sections 32(1), 33). |

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Cleaning and Debris Removal** | May promote the establishment of invasive plants onsite through the creation of disturbed soils and may spread invasive plants through the relocation of plants and soils containing invasive plant seeds. | No dispersal of noxious weeds or their seeds (*Weed Control Act*, Weed Control Regulation). |
| **Repair Works** | May release deleterious substances (sediment, cement-based products, epoxies, sealants) to a watercourse through repair works to drainage appliances | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). Deleterious substances include, but are not limited to, gasoline, oils, paints, sealants, concrete leachate, and sediment. |
| | May contaminate surface waters, groundwater, and soils through improper storage or disposal of materials used in repair works (e.g., concrete, sealants, epoxies) | Reporting of any polluting substance spills (*Environmental Management Act*, Section 79(5)) and disposal of all waste materials in accordance with the *Act* (*Environmental Management Act*, Waste Disposal Regulation). |
| **Replacement of Drainage Appliances** | May damage habitat by altering instream and bank structures and vegetation through the removal of existing drainage appliances and replacement activities | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7).<br>No alteration or destruction of a protected species' residence without approval (*Species at Risk Act*, Sections 32(1), 33). |
| **Placement of Riprap** | May release deleterious substances (sediment, cement-based products, epoxies, sealants) to a watercourse through replacement activities | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). Deleterious substances include, but are not limited to, gasoline, oils, concrete leachate, and sediment.<br>Reporting of any polluting substance spills (*Environmental Management Act*, Section 79(5)) and disposal of all waste materials in accordance with the *Act* (*Environmental Management Act*, Waste Disposal Regulation). |
| | May introduce sediment or other deleterious substances to a watercourse through site preparation for riprap placement or the placement of silt-laden or acid-rock riprap materials | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). Deleterious substances include, but are not limited to, gasoline, oils, sediment, and acid-rock leachate. |

## Environmental Best Practices

The following BPs have been compiled for routine maintenance works that do not require a *Water Act* Notification or further approvals from regulatory agencies (i.e., works on engineered wetlands and water quality ponds that are non-fish bearing and disconnected from fish-bearing channels). Should your works require a *Water Act* Notification or DFO authorization (i.e., works on a watercourse that contain fish and other aquatic species or fish habitat), more detailed BPs will be provided to you by the regulatory agency in response to your application.

The BPs in this document are provided as guidelines to help you ensure your works are completed in compliance with the performance standards and environmental legislation. Please note that the general BPs apply for most work activities within this category; if BPs specific to the activity are available they are also noted below.

### Regulatory Agency Contact

- Prior to beginning your engineered wetland and water quality pond management activities, identify any areas that may be of particular concern (sensitive habitat areas) found within your work area.
- Determine how much impact your required works will have on the identified areas. Is your engineered wetland or water quality pond occupied or accessible to fish? Are you removing a small debris pile from the pond inlet by hand or a large volume of accumulated sediment using an excavator? Will you be using cement-based materials or other potentially deleterious substances to repair a drainage appliance? Will your work sites be easy to isolate from flow? By asking these questions, you should be able to identify any planned works or areas that may be of concern to regulatory agencies.
- Meet with the appropriate regulatory agency contact, as listed in Section 8, to discuss site-specific environmental protection measures. Refer to Section 7 for information on the Memorandum of Understanding with MoE, and the recommended protocol for maintaining regular communications with regulatory agencies.

### Timing of Works

For most work activities within this category, the following general BPs apply:

- Works are preferably undertaken during periods of dry weather (e.g., summer) as this allows easier control of sediment. Typically this is also a less sensitive period for fish and wildlife than other seasons. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances.

### Site Management

- Minimize disturbance to areas surrounding the worksite and avoid impacts to surrounding trees and shrubs when preparing your worksite and undertaking your maintenance works.
- Identify areas containing invasive plants. Wetlands provide prime locations for the accumulation of water-borne invasive plant seeds and soils or debris should be managed with care.

- Apply native grass and ground cover seed mixes to exposed soils to reduce the risk of invasive plant establishment.

### Equipment Use

- Ensure all equipment used on site is well maintained and free of fluid leaks. Refuel and lubricate equipment on dry land away from watercourses. Use drip trays to contain any spillage during equipment maintenance.

### Worksite Isolation

- Isolate your work area from any flowing water that may be present. Ensure any flows are temporarily diverted around the wetland or pond.

- Contain any sediment-laden water generated during your works within your isolated work cell. Allow any generated sediment time to settle from the water column and ensure that water discharging from the pond is clear and free of sediment.

### Waste and Materials Containment

- Have a spill response plan in place and spill kits on site.

- Use clean materials, free of fine soils that may contribute sediment to the watercourse, when installing riprap or other bank erosion protection measures.

- If potentially deleterious materials (e.g., cement-based products) are used for repair works, ensure raw material and wash water will not be released to any watercourse.

- Where possible, sweep up loose material or debris. Any material thought to pose a risk of contamination to soils, surface water or groundwater should be disposed of appropriately off-site. Any clean surplus material should be removed to an area where it will not enter any watercourse, ditch, or channel.

- Dispose of excess materials, excavated soils, and removed debris away from any watercourse. Ensure that the material is placed in such a manner as to prevent its future introduction into any watercourse by installing silt fencing, seeding, or using similar sediment control BPs.

- Ensure excavated material containing invasive plant material is treated and disposed of properly.

### Erosion and Sediment Control

- If excavated materials or any other erodible materials are to be left on site, ensure they are placed in a manner that will prevent the introduction of sediment to any watercourse (i.e., temporary covers, grading and seeding, installation of silt fence around spoil piles).

- Install appropriate erosion and sediment control devices (e.g., silt fence installed below disturbed slopes, rock check dams and temporary silt dikes in low velocity, low volume outflow ditches) to prevent the transportation of sediment from your work area to downstream watercourses. Ensure that any structures installed are maintained and monitored until they are no longer needed (i.e., vegetative cover on seeded areas is adequate to control erosion).

## Key Information Sources

The documents and websites listed below are recommended resources for engineered wetland and water quality pond management activities. They can provide examples of existing protocols and management strategies, as well as additional information on specific operational BPs (e.g., erosion and sediment control techniques).

**MoT Technical Circulars:**

There are no relevant Technical Circulars authored to-date for this activity.

All Technical Circulars are available at:
http://www.th.gov.bc.ca/Publications/Circulars/Current_technical.asp

**Locally Developed BPs**
**(Provide any locally-developed BPs):**

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- 
-

**Other Resources:**

**Pond and Wetland Replacement Fact Sheet.** 2000. Environmental Management Section, Engineering Branch. Ministry of Transportation. http://www.th.gov.bc.ca/publications/eng_publications/environment/references/Ponds_and_Wetlands_Fact_Sheet.pdf

**Manual of Control of Erosion and Shallow Slope Movement.** August 1997. BC Ministry of Transportation.
http://www.th.gov.bc.ca/Publications/eng_publications/environment/references/Man_Control_Erosion.pdf

**T.I.P.S.: Targeted Invasive Plant Solutions.** Invasive Plant Council of British Columbia. 2008.
http://www.invasiveplantcouncilbc.ca/resources/targeted-invasive-plant-solutions-tips

**Case Study: Engineered Wetlands – Inland Island Highway.** Stewardship Centre for British Columbia website.
http://dev.stewardshipcanada.ca/caseStudies/NSCcs_builder.asp?request_no=147

**Standards and Best Practices For Instream Works.** March 2004. Ministry of Water, Land and Air Protection.
http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf

**Catalogue of Stormwater Best Management Practices.** September 2005. Idaho Department of Environmental Quality.
http://www.deq.state.id.us/water/data_reports/storm_water/catalog/index.cfm

## Checklist for Environmental Protection Requirements

☐ Is your proposed work considered a "routine" maintenance activity? If not, approvals or permits may be required. Contact your local municipal, provincial, or federal regulatory agency staff.

☐ Has this project been discussed with local environmental regulatory staff? In addition to the BP information presented, other site-specific conditions may apply.

☐ Have site-specific environmental protection requirements been identified? List below:

☐ ____________________

☐ ____________________

☐ ____________________

☐ ____________________

*Highway Maintenance Specification Sections*

3-300 Highway Snow Removal

3-310 Winter Abrasive and Chemical Snow and Ice Control

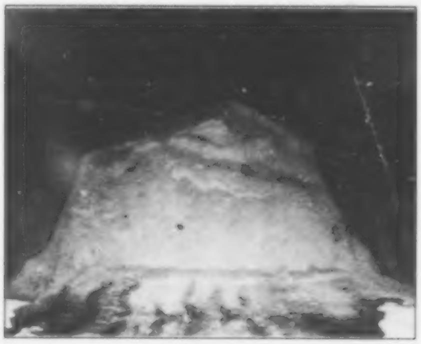
3-320 Roadside Snow and Ice Control

Available at:

http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Schedule 21 Maintenance Specifications.pdf

## 5.9 Winter Road Management

Winter road maintenance activities include snow removal, snow and ice control, and application of winter abrasives and de-icing chemicals. These activities are undertaken to ensure winter road surfaces remain clear and safe for the travelling public.



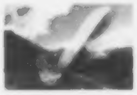
### Environmental Issues

Primary environmental issues relating to routine winter road management activities are summarized in the following table. It should be noted that site-specific conditions might present additional issues you will need to address in planning and undertaking your works.

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Snow Removal** | May introduce sediment or other deleterious substances to a watercourse through snow removal activities or improper storage | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)).<br>Reporting of any polluting substance spills (*Environmental Management Act*, Section 79(5)) and disposal of all waste materials in accordance with the *Act* (*Environmental Management Act*, Waste Disposal Regulation). |

**Standards and Best Practices For Instream Works.** March 2004. Ministry of Water, Land and Air Protection.
http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf

**Catalogue of Stormwater Best Management Practices.** September 2005. Idaho Department of Environmental Quality.
http://www.deq.state.id.us/water/data_reports/storm_water/catalog/index.cfm



## Checklist for Environmental Protection Requirements

☐ Is your proposed work considered a "routine" maintenance activity? If not, approvals or permits may be required. Contact your local municipal, provincial, or federal regulatory agency staff.

☐ Has this project been discussed with local environmental regulatory staff? In addition to the BP information presented, other site-specific conditions may apply.

☐ Have site-specific environmental protection requirements been identified? List below:

☐ ____________________

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## 5.9 Winter Road Management

***Highway Maintenance Specification Sections***

3-300 Highway Snow Removal

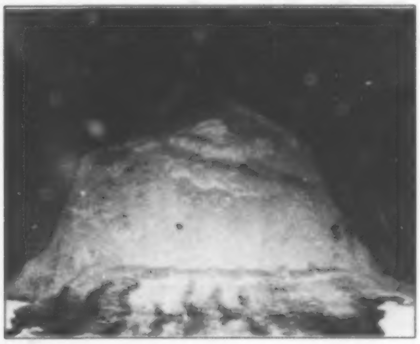
3-310 Winter Abrasive and Chemical Snow and Ice Control

3-320 Roadside Snow and Ice Control

Available at:

http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Schedule 21 Maintenance Specifications.pdf

Winter road maintenance activities include snow removal, snow and ice control, and application of winter abrasives and de-icing chemicals. These activities are undertaken to ensure winter road surfaces remain clear and safe for the travelling public.



### Environmental Issues

Primary environmental issues relating to routine winter road management activities are summarized in the following table. It should be noted that site-specific conditions might present additional issues you will need to address in planning and undertaking your works.

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Snow Removal** | May introduce sediment or other deleterious substances to a watercourse through snow removal activities or improper storage | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)).<br>Reporting of any polluting substance spills (*Environmental Management Act*, Section 79(5)) and disposal of all waste materials in accordance with the *Act* (*Environmental Management Act*, Waste Disposal Regulation). |

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Snow Removal** | May damage aquatic features, roadside riparian vegetation, or other significant habitats through the side casting of accumulated snow, ice, sediment, and de-icing compounds | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7). |
| | May damage habitat through the improper location of sediment and debris disposal sites in ditches, wetlands, or other significant habitat areas | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7). |
| **Application of Winter Aggregate and De-icing Compounds** | May introduce sediment or other deleterious substances to a watercourse through application or improper materials containment at storage location | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)).<br>Reporting of any polluting substance spills (*Environmental Management Act*, Section 79(5)) and disposal of all waste materials in accordance with the *Act* (*Environmental Management Act*, Waste Disposal Regulation). |
| | May damage roadside and riparian vegetation or other significant habitats through the over-spraying of de-icing compounds | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7). |
| **Spring Cleaning of Winter Traction Materials**<br>*See Section 6.3* | May degrade air quality and highway visibility, particularly in spring, posing health and safety problems for highway users and nearby residents | Compliance with local air quality regulations and municipal bylaws. |
| | May introduce sediment or other deleterious substances (i.e., salt, sand, aggregates) to roadside watercourses through runoff or the cleaning of accumulated materials from the highway surface | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). |
| | May contaminate surface waters, groundwater, and soils when snowbanks melt and release accumulated de-icing and anti-icing compounds | Reporting of any polluting substance spills (*Environmental Management Act*, Section 79(5)) and disposal of all waste materials in accordance with the Act (*Environmental Management Act*, Waste Disposal Regulation). |

## Environmental Best Practices

The following BPs are provided as guidelines to help you ensure your routine works are completed in compliance with the performance standards and environmental legislation. Please note that the general BPs provided apply for most work activities within this category; if BPs specific to the activity are available they are also noted below.

### Regulatory Agency Contact

- Prior to beginning your winter road management activities, identify any sensitive habitat areas, including wetted ditches and natural watercourses (streams, lakes and marine foreshores), found within your work area that may be of concern to regulatory agencies.

- Meet with the appropriate regulatory agency contact, as listed in Section 8, to discuss site-specific environmental protection measures. Refer to Section 7 for information on the Memorandum of Understanding with MoE and the recommended protocol for maintaining regular communications with regulatory agencies.

### Site Management

- Identify and avoid sensitive habitat areas that may be negatively impacted from the side-casting of snow and ice cleared from winter roads. For example, pools on small streams crossing the highway provide essential winter habitat for fish. These pools can be lost when ploughed material accumulates and displaces water in the pool with ice and snow.

- Avoid ploughing snow and ice into sensitive habitat areas. In addition to contributing to habitat losses, winter aggregate materials (e.g., sand, salt, etc) can infill channels and degrade habitat and water quality in watercourses and wetlands.

### Material Selection

- Consider the use of alternatives to road salt in environmentally sensitive areas (i.e., near watercourses).

- Where possible, in areas where dust generation is a concern during spring highway surface cleaning activities, choose larger-sized aggregate or pre-washed materials to help minimize dust generation.

### Materials Storage

- Store materials such as de-icing compounds on impermeable surfaces to prevent their release to soils and groundwater.

- Minimize loss at storage piles. Ensure that aggregate storage piles are not contributing sediment to nearby watercourses. Keep storage piles of materials containing de-icing compounds (road salt) well covered and dry to prevent chemical release in storm water runoff.

- Use caution during loading of trucks to minimize loss of materials.

- Ensure that hazardous materials use, storage and disposal is in accordance with the information contained in their Material Safety Data Sheets.
- Minimize the release of salty snowmelt waters from snow storage piles to soils and groundwater by directing runoff to areas less sensitive to impact.

### Equipment Use

- Ensure equipment is selected and operated to more accurately apply salt to road surfaces and prevent over-spray.
- Reduce the need for salt application through better removal of snow and ice prior to the application of de-icing chemicals.

## Key Information Sources

The documents and websites listed below are recommended resources for winter road maintenance. They can provide examples of existing protocols and management strategies, as well as additional information on specific operational BPs (e.g., erosion and sediment control techniques).

### MoT Technical Circulars:

There are no relevant Technical Circulars authored to-date for this activity.

All Technical Circulars are available at:
http://www.th.gov.bc.ca/Publications/Circulars/Current_technical.asp

### Locally Developed BPs (Provide any locally-developed BPs):

- 
- 
-

### Other Resources:

**Water Quality Best Management Practices Compendium Website.** Environmental Protection Division, Ministry of Environment.
http://www.env.gov.bc.ca/wat/wq/nps/BMP_Compendium/nps_bmp.htm

**Best Management Practices to Mitigate Road Dust from Winter Traction Materials.** Ministry of Water, Land and Air Protection. March 2005.
http://www.env.gov.bc.ca/air/airquality/pdfs/roaddustbmp_june05.pdf

**Road Salt and Snow and Ice Control Primer.** Transportation Association of Canada. December 1999.
http://www.tac-atc.ca/francais/pdf/primer.pdf

**Roadsalt and Winter Maintenance for British Columbia Municipalities, Best Management Practices to Protect Water Quality.** Warrington, P.D. December 1998
http://www.env.gov.bc.ca/wat/wq/bmps/roadsalt.html

**Environmental Impacts of Road Salts.** Environment Canada Science and Environment Bulletin. January/February 2002.
http://www.ec.gc.ca/science/sandejan02/article3_e.html

### Checklist for Environmental Protection Requirements

☐ Is your proposed work considered a "routine" maintenance activity? If not, approvals or permits may be required. Contact your local municipal, provincial, or federal regulatory agency staff.

☐ Has this project been discussed with local environmental regulatory staff? In addition to the BP information presented, other site-specific conditions may apply.

☐ Have site-specific environmental protection requirements been identified? List below:

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## 5.10 Roadside Vegetation Management

Roadside vegetation management activities include mowing, brushing, and landscape maintenance activities undertaken to maintain clear sight lines for highway users, control noxious weeds, facilitate effective drainage, and reduce possible fire hazards.

*Highway Maintenance Specification Sections*

4-350 Roadside Vegetation Control

Available at:

http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Schedule 21 Maintenance Specifications.pdf

### Environmental Issues

Primary environmental issues relating to routine roadside vegetation management activities are summarized in the following table. It should be noted that site-specific conditions might present additional issues you will need to address in planning and undertaking your works.

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Brushing** | May disturb riparian vegetation (upland fish habitat) | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)). |
| | May expose erodible soils and promote sediment discharge or cause erosion of watercourse banks if riparian buffer zones along watercourses are cleared | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7). |
| | May disturb birds and their nests | No injury, molestation or destruction of a bird, its egg, and occupied nest, or the nest of an eagle, Peregrine Falcon, Gyrfalcon, Osprey, heron, or Burrowing Owl, unless the species is listed under Schedule C as exempt from this protection (*Wildlife Act*, Section 34).<br>No killing, capturing, injuring, taking or disturbing migratory birds or damaging, destroying, removing or disturbing their nests, unless permitted under the *Act* (*Migratory Birds Convention Act*) |

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Mowing** | May disturb riparian vegetation (upland fish habitat) | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)). |
| | May disturb birds and their nests<br>May contribute to spread of invasive plants | No injury, molestation or destruction of a bird, its egg, and occupied nest, or the nest of an eagle, Peregrine Falcon, Gyrfalcon, Osprey, heron, or Burrowing Owl, unless the species is listed under Schedule C as exempt from this protection (*Wildlife Act*, Section 34).<br>No killing, capturing, injuring, taking or disturbing migratory birds or damaging, destroying, removing or disturbing their nests, unless permitted under the *Act* (*Migratory Birds Convention Act*)<br>Control of Noxious Weeds (*Weed Control Act*) |
| **Noxious Weed / Invasive Plant Control** | May contribute to the spread of noxious weeds if the removed material is improperly handled and may displace native vegetation | No dispersal of noxious weeds or their seeds (*Weed Control Act*, Weed Control Regulation) |
| | May introduce sediment or other deleterious substances to a watercourse when control methods are implemented | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7). |
| | May displace desirable riparian vegetation (upland fish habitat)<br>Noxious weeds can adversely affect animal and public health, e.g., skin burns from Hog Weed | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)). |

## Environmental Best Practices

The following BPs are provided as guidelines to help you ensure your routine works are completed in compliance with the performance standards and environmental legislation. Please note that the general BPs provided apply for most work activities within this category; if BPs specific to the activity are available they are also noted below.

### Regulatory Agency Contact

- Work with your local regulatory agencies to establish a protocol for vegetation removal in your area.
- Meet with the appropriate regulatory agency contact, as listed in Section 8, to discuss site-specific environmental protection measures. Refer to Section 7 for information on the Memorandum of

Understanding with MoE and the recommended protocol for maintaining regular communications with regulatory agencies.

- For invasive plant control work this will involve meeting with the local invasive plant coordinator and/or weed control contractors to review proposed vegetation control work.

## Timing of Works

- Be aware that vegetation clearing can negatively impact nesting birds in spring and early summer. Inspect your work area for any occupied bird nests, eggs, or nests of species protected under the *Wildlife Act* and *Migratory Bird Convention Act* during this period.

**Riparian Buffer Widths**

The width of vegetation you are required to protect on each bank of a watercourse can vary greatly depending on the specific conditions of the site.

Contact your local regulatory agencies to discuss what buffer widths are applied in your area.

## Site Management

- Keep cut vegetation out of the watercourse. Move debris away from the bank to prevent its movement into the channel.
- If your works create areas of exposed soils and there is the potential for sediment to be transported to a watercourse, install appropriate erosion and sediment controls. Areas of exposed soils should be stabilized through reseeding or some other manner.

### Brushing and Mowing

- Establish an annual brushing/mowing schedule in collaboration with the regional invasive plant committee coordinator and, whenever possible, schedule the route so that activities start in un-infested areas and move toward infested area.
- Implement thorough and effective mowing, where practical, around riparian areas, wells, and other areas where herbicides cannot be applied.
- Prior to beginning your vegetation management activities, identify sensitive habitat areas, including watercourses—streams, lakes and marine foreshores– found within your work area.
- Avoid mowing grasses and vegetation lower than 15cm above ground level—this is particularly important for steep slopes where erosion potential is high.
- Determine how much impact your required works will have on the identified areas—are you required to remove a sight distance obstruction on an inside curve above a watercourse crossing? Are you required to mow vegetation within a drainage ditch that may constitute fish habitat? By asking these questions, you should be able to identify planned works that may be of concern to regulatory agencies.
- Maintain established riparian buffer zones, which should be visible from past vegetation removal activity. If no clear buffer zone is visible, determine the width of the buffer required for the watercourse.

Typical widths may range from 15-50m, but the required width will vary depending on factors including the type and size of the watercourse and its fisheries value. Consultation with DFO is highly recommended at this stage, as is the assistance of appropriately qualified and experienced professionals.

- Identify the appropriate required buffer width from each watercourse bank (i.e., on either side of each stream and along lake and marine foreshores). This applies also to watercourses or foreshores that parallel a highway. In the case of a watercourse or water body paralleling a highway, the required buffer might include all roadside vegetation and preclude any removal activities. In this case, discussion will be needed with your local MoE Habitat or Conservation Officers and DFO Habitat Management staff.
- Stop brushing or mowing once the buffer is reached. Move past the watercourse and recommence at the end of the opposing buffer zone.
- If vegetation removal activities are required within the buffer zone (e.g., to remove sight distance obstructions on curves, intersections or watercourse banks parallel to the highway; to reduce winter icing problems, or to permit access to structures):
  - Limit the area of clearing.
  - Consider limbing or topping the vegetation to the required height versus complete removal.
  - Ensure root structures and bank stability is maintained.
  - Use hand-tools where possible.
  - Ensure all tools and equipment is clean and well maintained.
  - Consider installing slower-growing plant species along areas of the right-of-way where regular maintenance is required (e.g., sight-lines, access to infrastructure) to reduce the need for frequent cutting.
  - Refer to the T.I.P.S. publication referenced for mowing best practices as they relate to invasive plant management, including proper timing, cutting technique and planning of work.
- Do not brush or mow within 7 days of an herbicide treatment. Encourage herbicide application contractors to visibly mark treatment areas along roadways.

### Invasive Plant Control

- Ensure all chemical control of noxious weeds/invasive plants is done under a valid Pest Management Plan and/or Permit from MoE.
- Contractors should coordinate manual/mechanical controls with other agencies carrying out herbicide work on invasive plants.

- Ensure all noxious weed/invasive plant materials are disposed of in accordance with the *Weed Control Act* Regulations and any local area protocols.
- When transporting noxious weeds/invasive plant or their seeds use a covered container.
- Ensure that any vehicle or equipment used in the removal of noxious weed/invasive plants is free of noxious weed/invasive plant and seed-containing materials when it leaves the work area.
- Prior to removing invasive plant species refer to methods outlined in the T.I.P.S. publications created by the Invasive Plant Council of British Columbia.
- Ensure that noxious weed/invasive plant removal or control methods which chemically or physically modify habitat are in accordance with the *Integrated Pest Management Act* & Regulations, Section 9 of the *Water Act*, and Section 35(1) of the *Fisheries Act*.

## Key Information Sources

The documents and websites listed below are recommended resources for roadside vegetation management. They can provide examples of existing protocols and management strategies, as well as additional information on specific operational BPs (e.g., erosion and sediment control techniques).

### MoT Technical Circulars:

**Roadside Development Landscape Policy** – MoT Technical Circular T-9/91

This and all other Technical Circulars are available at:
http://www.th.gov.bc.ca/Publications/Circulars/Current_technical.asp

### Locally Developed BPs (Provide any locally-developed BPs):

- Brushing – Skeena BMPs for Road Maintenance.
  Ministry of Transportation. 2003.
  http://www.th.gov.bc.ca/publications/eng_publications/best_practices/bp.pdf
-

### Other Resources:

**T.I.P.S.: Targeted Invasive Plant Solutions.** Invasive Plant Council of British Columbia. 2008.
http://www.invasiveplantcouncilbc.ca/resources/targeted-invasive-plant-solutions-tips

**Maintenance of Riparian Vegetation in Existing Rights-of-Way – Pacific Region Operational Statement.** 2008. Fisheries and Oceans Canada (DFO).

http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/os-riparian_veg_maint_e.htm

**Riparian Management Area Guidebook.** Forest Practices Code. Ministry of Forests. 1995.
http://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/riparian/Rip-toc.htm

***BC Weed Control Act:* Noxious Weeds in BC Website.** Pest Management, Ministry of Agriculture and Lands.
http://www.agf.gov.bc.ca/cropprot/noxious.htm

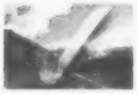
**Roadside Vegetation Management Website.** US Department of Transportation. Federal Highway Administration
http://www.fhwa.dot.gov/environment/vegmgt/

**"Dangerous Travelers" Invasive Plant Control Video**
http://www.fs.fed.us/invasivespecies/prevention/dangeroustravelers.shtml

**Invasive Plant Strategy for British Columbia.** Undated. Invasive Plant Council of BC.
www.invasiveplantcouncilbc.ca/publications/invasive-plant-strategy.pdf

**A Legislative Guidebook to Invasive Plant Management in BC.** Invasive Plant Council of BC. 2007.
www.invasiveplantcouncilbc.ca/publications/ipcbc-reports/IPC3-Legislative-Guidebook.pdf

**Ministry of Environment, Riparian Area Regulation**
http://www.env.gov.bc.ca/habitat/fish_protection_act/riparian/documents/RAR_Pamphlet.pdf



## Checklist for Environmental Protection Requirements

☐ Is your proposed work considered a "routine" maintenance activity? If not, approvals or permits may be required. Contact your local municipal, provincial, or federal regulatory agency staff.

☐ Has this project been discussed with local environmental regulatory staff? In addition to the BP information presented, other site-specific conditions may apply.

☐ Have site-specific environmental protection requirements been identified? List below:

☐ ______________________________

☐ ______________________________

☐ ______________________________

## 5.11 Rest Area and Roadside Facilities Management

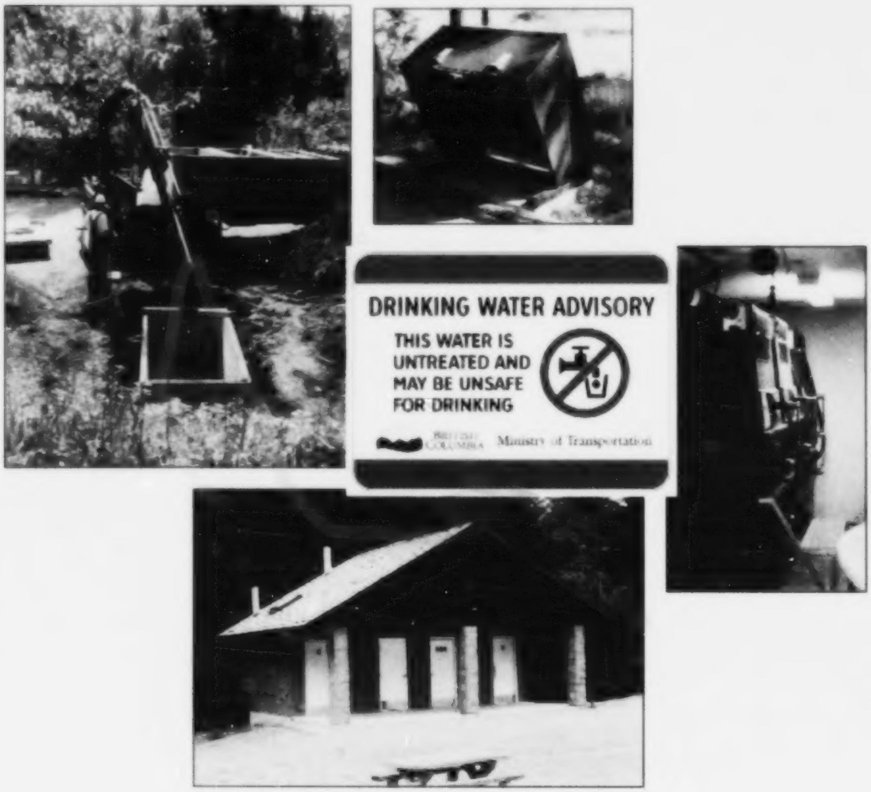
*Highway Maintenance Specification Sections*

4-380 Rest Area and Roadside Facilities Maintenance

Available at:

http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Schedule 21 Maintenance Specifications.pdf

Highway rest areas and roadside facilities, including septic field maintenance, disposal of compost toilet materials, and litter and garbage collection, require regular maintenance activities to ensure they remain safe and useable for the motoring public.


DRINKING WATER ADVISORY
THIS WATER IS UNTREATED AND MAY BE UNSAFE FOR DRINKING
BRITISH COLUMBIA Ministry of Transportation

### Environmental Issues

Primary environmental issues relating to routine rest area and roadside facilities management activities are summarized in the following table. It should be noted that site-specific conditions might present additional issues you will need to address in planning and undertaking your works.

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Septic System Maintenance** | May pose a threat of disease through improper storage or disposal of sewage | Installation, construction and maintenance of sewage disposal facilities in accordance with applicable legislation (*BC Heath Act*, Sewage Disposal Regulations).<br>Disposal and storage of septic wastes in accordance with local public health regulations and bylaws. |
| | May damage habitat through the improper location of septic systems or disposal sites near ditches, wetlands, or other significant habitat areas | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)).<br>No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7). |
| **Potable Water Supply Maintenance** | May impact public health through potential contamination risk to drinking water quality. | Collection of water samples as required by any MoT Local Area Specification, in accordance with the *Drinking Water Protection Act* and Regulations. |
| **Garbage and Litter Disposal** | May threaten both wildlife and public safety through the attraction of wildlife to rest areas and roadside facilities | Storage or garbage and litter in wildlife-protected litter containers and timely disposal of garbage. |
| | May contaminate surface waters, groundwater, and soils through improper storage or disposal of waste material<br>Wasps and other insects may pose a health concern in garbage receptacles | Reporting of any polluting substance spills (*Environmental Management Act*, Section 79(5)) and disposal of all waste materials in accordance with the *Act* (*Environmental Management Act*, Waste Disposal Regulation).<br>Timely removal of garbage, secure containers. |
| **Noxious Weed / Invasive Plant Control** | Invasive plants may establish at rest areas/pullouts through motorist activity & vehicles, and become a source for further spread if not treated/removed properly.<br>May displace desirable native vegetation | No spread of invasive plants and control of noxious weeds (*Weed Control Act*, Weed Control Regulation). |

## Environmental Best Practices

The following BPs are provided as guidelines to help you ensure your routine works are completed in compliance with the performance standards and environmental legislation. Please note that the general BPs provided apply for most work activities within this category; if BPs specific to the activity are available they are also noted below.

### Regulatory Agency Contact

- Prior to beginning your rest area and roadside facilities management activities, identify any sensitive habitat areas, including watercourses – streams, lakes and marine foreshores– found within your work area.
- Determine how much impact your required works will have on the identified areas. Are you replacing a septic tank at a lakeside rest area? Where will you place the wastes you remove from the site? Are you removing noxious weeds or invasive plants? By asking these questions, you should be able to identify any planned works that may be of concern to regulatory agencies.
- Meet with the appropriate regulatory agency contact, as listed in Section 8, to discuss site-specific environmental protection measures. Refer to Section 7 for information on the Memorandum of Understanding with MoE and the recommended protocol for maintaining regular communications with regulatory agencies.
- For potable water issues, contact the local Drinking Water Protection Officer.
- For invasive plant control work, meet with the local invasive plant coordinator and/or weed control contractors to review proposed vegetation control work.

### Timing of Works

For most work activities within this category, the following general BPs apply:

- Works are preferably undertaken during periods of dry weather (e.g., summer) as this allows easier control of sediment. Typically this is also a less sensitive period for fish and wildlife than other seasons. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances.
- If your maintenance activities require work instream, you must schedule them to coincide with your region's instream work window. Contact your local MoE and DFO offices for further information on timing windows for your District.
- Be aware that vegetation clearing can negatively impact nesting birds in spring and early summer. Inspect your work area for any occupied bird nests, eggs, or nests of species protected under the *Wildlife Act* and *Migratory Bird Convention Act* during this period.

### Site Management

- Should your works involve the disturbance of soils or the use of erodible materials (e.g., sands, topsoil) near watercourses, prevent the transport of sediment through the installation of appropriate erosion and sediment control BPs and devices.

**Septic Waste Systems**

- Maintain septic tanks and fields in accordance with manufacturer's maintenance specifications.
- Divert surface water, perimeter drains and roof drains away from septic fields.
- Ensure no trees or plants with strong root systems are planted near septic fields and tanks.
- Limit the use of bleaches and chemical cleaners and ensure toxic substances are not placed in toilets.

**Potable Water Sources**

- Maintain water sources, pumps, wells and water systems.
- Perform routine flushing of the water systems as required.
- Collect water quality samples following Local Area Specifications. Ensure an accredited laboratory performs water quality tests for physical and chemical parameters. Report any issues with water quality immediately.
- Ensure drinking water advisory signing is provided, where necessary.

**Invasive Plant Control**

- Ensure all chemical control of noxious weeds/invasive plants is done under a valid Pest Management Plan and/or Permit from MoE.
- Contractors should coordinate manual/mechanical controls with other agencies carrying out herbicide work on invasive plants.
- Ensure all noxious weed/invasive plant materials are disposed of in accordance with the *Weed Control Act* Regulations and any local area protocols.
- When transporting noxious weeds/invasive plant or their seeds use a covered container.
- Ensure that any vehicle or equipment used in the removal of noxious weed/invasive plants is free of noxious weed/invasive plant and seed-containing materials when it leaves the work area.
- Prior to removing invasive plant species refer to methods outlined in the T.I.P.S. publications created by the Invasive Plant Council of British Columbia.
- Ensure that noxious weed/invasive plant removal or control methods that chemically or physically modify habitat are in accordance with the Integrated *Pest Management Act* & Regulations, Section 9 of the *Water Act*, and Section 35(1) of the *Fisheries Act*.

### Equipment Use

- Ensure any equipment used on site is well maintained and free of fluid leaks.
- Clean equipment and tools in a manner that will ensure any wash water generated is managed so as to prevent its release to watercourses or road drains.

### Waste and Materials Containment

- Store any hazardous materials used in accordance with applicable regulations and ensure that deleterious substances are handled with care.
- Mix any hazardous materials to be used in a contained area to reduce the risk of contaminating soils or surface waters adjacent to the road surface.
- Ensure septic tanks are cleaned regularly, as required by use levels and maintenance requirements.
- When transporting noxious weeds/invasive plant or their seeds use a covered container.

#### Garbage and Waste Disposal

- Use secure garbage containers designed to be "bear-proof" or inaccessible to wildlife.
- Remove any accumulated garbage or litter regularly and dispose of at a designated landfill.
- Do not bury garbage onsite.
- Ensure composted waste is disposed of in accordance with applicable public health regulations.
- Dispose of composted waste only when it is completely decomposed.
- If compost is disposed of on-site, bury compost materials completely, near tree roots or other non-edible plants and away from watercourses and wells.
- Ensure all noxious weed/invasive plant materials are disposed of in accordance with the *Weed Control Act* Regulations and any local area protocols.

## Key Information Sources

The documents and websites listed below are recommended resources for rest area and roadside facilities management. They can provide examples of existing protocols and management strategies, as well as additional information on specific operational BPs (e.g., erosion and sediment control techniques).

**MoT Technical Circulars:**

**Roadside Development Landscape Policy** – MoT Technical Circular T-8/91

This and all other MoT Technical Circulars are available at: http://www.th.gov.bc.ca/publications/Circulars/technical_circulars.asp

**Locally Developed BPs**
**(Provide any locally-developed BPs):**

**Local Area Specifications for Water Testing – Ministry of Transportation**
http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Standards_Specs_Local_Area/sa07/LAS6_water_testing.pdf

**Other Resources:**

**T.I.P.S.: Targeted Invasive Plant Solutions.** Invasive Plant Council of British Columbia. 2007.
http://www.invasiveplantcouncilbc.ca/resources/targeted-invasive-plant-solutions-tips

*BC Weed Control Act:* **Noxious Weeds in BC Website.** Pest Management, Ministry of Agriculture and Lands.
http://www.al.gov.bc.ca/cropprot/noxious.htm

**Water Quality Best Management Practices Compendium Website.** Environmental Protection Division, Ministry of Environment.
http://www.env.gov.bc.ca/wat/wq/nps/BMP_Compendium/nps_bmp.htm

**Phoenix Composting Toilets**
http://www.compostingtoilet.com/Public/Ap_Guide/Ap_Guide.htm#Maintain

**Bearproof Litter Receptacles**
http://www.haulall.com/hidabag.htm

**Composting Toilets Technology Fact Sheet.** United States Environmental Protection Agency.
http://www.epa.gov/OW-OWM.html/mtb/comp.pdf

**Don't Attract Bears to Garbage Brochure.** 1999. BC Ministry of Environment.
http://wlapwww.gov.bc.ca/wld/pub/beargarbage/garbg_br1.htm

## Checklist for Environmental Protection Requirements

☐ Is your proposed work considered a "routine" maintenance activity? If not, approvals or permits may be required. Contact your local municipal, provincial, or federal regulatory agency staff.

☐ Has this project been discussed with local environmental regulatory staff? In addition to the BP information presented, other site-specific conditions may apply.

☐ Have site-specific environmental protection requirements been identified? List below:

☐ ____________________

☐ ____________________

☐ ____________________

☐ ____________________

## 5.12 Roadside Fence Maintenance

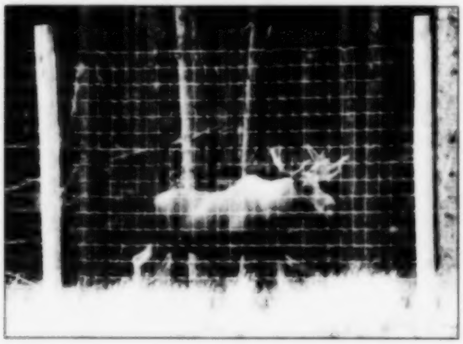
*Highway Maintenance Specification Sections*

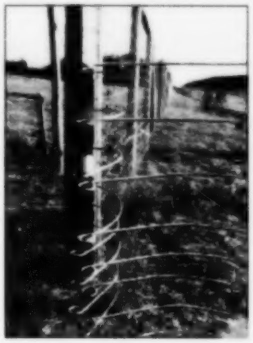
4-400 Roadside Fence Maintenance

Available at:

http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Schedule 21 Maintenance Specifications.pdf

Control of wildlife movement onto highways is important for both wildlife and public safety. Roadside fences are required to restrict wildlife, livestock, game, and pedestrian access to Highway right-of-ways. Fence that is in disrepair may not contain wildlife and livestock and allow animal movement onto highways endangering both animals and motorists. Damaged fence and gates may also injure animals. Maintenance of roadside and wildlife exclusion fencing is therefore needed to restore functionality to sections that have deteriorated or been damaged by motor vehicle accidents, vandalism, or natural events.





### Environmental Issues

Primary environmental issues relating to roadside fence maintenance activities are summarized in the following table. It should be noted that site-specific conditions might present additional issues you will need to address in planning and undertaking your works.

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Repair Works** | May release deleterious substances (cement-based products, wood preservatives, etc.) to a watercourse | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). Deleterious substances include, but are not limited to, gasoline, oils, sealants, concrete leachate, preservatives and sediment. |
| | May disturb riparian habitat by impacting the banks or removing vegetation | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream and associated riparian habitat unless authorized by a *Water Act* approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7). |

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| Repair Works | May disturb wildlife species (e.g., birds) | No injury, molestation or destruction of a bird, its egg, and occupied nest, or the nest of an eagle, Peregrine Falcon, Gyrfalcon, Osprey, heron, or Burrowing Owl, unless the species is listed under Schedule C as exempt from this protection (*Wildlife Act*, Section 34).<br>No killing, capturing, injuring, taking or disturbing migratory birds or damaging, destroying, removing or disturbing their nests, unless permitted under the *Act (Migratory Birds Convention Act)*. |
| | May contaminate surface waters, groundwater, and soils through improper storage or disposal of materials | Reporting of any polluting substance spills (*Environmental Management Act*, Section 79(5)) and disposal of all waste materials in accordance with the *Act* (*Environmental Management Act*, Waste Disposal Regulation). |
| | May contribute to the spread of noxious weeds or invasive plants if disturbed areas are not re-vegetated with desirable material | No dispersal of noxious weeds or their seeds (*Weed Control Act*, Weed Control Regulation). |

## Environmental Best Practices

The following BPs are provided as guidelines to help you ensure your routine works are completed in compliance with the performance standards and environmental legislation. Please note that the general BPs provided apply for most work activities within this category; if BPs specific to the activity are available they are also noted below.

### Regulatory Agency Contact

- Prior to beginning your fence management activities, identify any sensitive habitat areas including watercourses—streams, lakes and marine foreshores—found within your work area.
- Determine how much impact your required works will have on the identified areas.
- Meet with the appropriate regulatory agency contact, as listed in Section 8, to discuss site-specific environmental protection measures. Refer to Section 7 for information on the Memorandum of Understanding with MoE and the recommended protocol for maintaining regular communications with regulatory agencies.

### Site Management

- Wildlife exclusion fencing and associated components, such as one-way gates and ungulate guards, are to be inspected and repaired at least once per calendar year in late spring or early summer.

- Repairs to fencing should be made before the onset of winter as snowfalls may restrict access to the fencing or further damage weakened fencing.
- Fallen trees must be removed from fences as soon as possible. Fallen or sagging fence must be raised or replaced to maintain the designed fence height and prevent wildlife from breaching the fence.
- Broken fence mesh, wooden posts and cross-members, bent metal poles and broken or bent gate tynes must be repaired or replaced with identical materials.
- Post or poles must be relocated to more stable ground if soil erosion or failure undermines or destabilizes fence or post/pole foundations.
- Wildlife exclusion fencing and gate areas must be kept clear of vegetation (trees, shrubs) to a width of 3 metres on either side to ensure access and proper functioning
- Should your works involve the disturbance of soils, create areas of exposed soils, or the use of wet cement near watercourses, prevent the transport of sediment through the installation of appropriate erosion and sediment control BPs and devices.
- Be aware that vegetation clearing can negatively impact nesting birds in spring and early summer. Inspect your work area for any occupied bird nests, eggs, or nests of species protected under the *Wildlife Act* and *Migratory Bird Convention Act* during this period.
- Ensure all noxious weed/invasive plant materials are transported and disposed of in accordance with the *Weed Control Act* Regulations and any local area protocols.

### Equipment Use

- Select appropriate equipment and work access routes to reduce damage to riparian vegetation and watercourse bank.
- If working near a watercourse, ensure all equipment used on site is well maintained and free of fluid leaks. Refuel and lubricate equipment on dry land away from watercourses. Use drip trays to contain any spillage during equipment maintenance.

## Key Information Sources

The documents and websites listed below are recommended resources for highway incident and vandalism response activities. They can provide examples of existing protocols and management strategies, as well as additional information on specific operational BPs (e.g., erosion and sediment control techniques).

### MoT Technical Circulars:

There are no relevant Technical Circulars authored to-date for this activity.

All Technical Circulars are available at:
http://www.th.gov.bc.ca/Publications/Circulars/Current_technical.asp

### Locally Developed BPs (Provide any locally-developed BPs):

-
-
-

### Other Resources:

**Wildlife Exclusion Fencing – Section 700 – 2008 Standard Specifications for Highway Construction.** 2008. BC Ministry of Transportation and Infrastructure.
http://www.th.gov.bc.ca/Publications/const_maint/contract_serv/standard_specs/2009_Stand_Specs_Vol_2.pdf

**Fence Construction – Section 741 – 2008 Standard Specifications for Highway Construction.** 2008. BC Ministry of Transportation and Infrastructure.
http://www.th.gov.bc.ca/Publications/const_maint/contract_serv/standard_specs/2009_Stand_Specs_Vol_2.pdf

**Riparian Management Area Guidebook.** 1995. Forest Practices Code. Ministry of Forests. 1995.
http://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/riparian/Rip-toc.htm

***BC Weed Control Act:* Noxious Weeds in BC Website.** Pest Management, Ministry of Agriculture, Food and Fisheries and Lands.
http://www.agf.gov.bc.ca/cropprot/noxious.htm

**T.I.P.S.: Targeted Invasive Plant Solutions.** Invasive Plant Council of British Columbia. 2008.
http://www.invasiveplantcouncilbc.ca/resources/targeted-invasive-plant-solutions-tips

**Maintenance of Riparian Vegetation in Existing Rights-of-Way – Pacific Region Operational Statement.** 2008. Fisheries and Oceans Canada (DFO).
http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/os-riparian_veg_maint_e.htm

**Wildlife Exclusion Systems for Accident Mitigation on British Columbia Highways, 2005.** Leonard E. Sielecki, BC Ministry of Transportation
http://repositories.cdlib.org/cgi/viewcontent.cgi?article=1339&context=jmie/roadeco

### Checklist for Environmental Protection Requirements

☐ Is your proposed work considered a "routine" maintenance activity? If not, approvals or permits may be required. Contact your local municipal, provincial, or federal regulatory agency staff.

☐ Has this project been discussed with local environmental regulatory staff? In addition to the BP information presented, other site-specific conditions may apply.

☐ Have site-specific environmental protection requirements been identified? List below:

☐ ____________________

☐ ____________________

☐ ____________________

☐ ____________________

## 5.13 Bridge Structure Management

Bridge structure management activities include the cleaning and painting of bridge structures as well as the repair, rehabilitation, and replacement of bridge elements including decks, railings, abutments, and bearings. Works may include concrete works, and timber truss and piling maintenance. These activities help to ensure bridge structures remain structurally sound and safe for public use.

### Environmental Issues

Primary environmental issues relating to routine bridge structure management activities are summarized in the following table. It should be noted that site-specific conditions might present additional issues you will need to address in planning and undertaking your works.

***Highway Maintenance Specification Sections***

| | |
|---|---|
| 6-500 | Bridge Deck Maintenance |
| 6-510 | Bridge and Structure Cleaning |
| 6-520 | Bridge Drain and Flume Maintenance |
| 6-530 | Bridge Joint Maintenance |
| 6-540 | Bridge Bearing Maintenance |
| 6-560 | Bailey and Acrow Bridge Maintenance |
| 6-570 | Minor Painting of Bridge Structure |
| 6-600 | Concrete Structure Maintenance |
| 6-605 | Steel and Aluminum Structure Maintenance |
| 6-620 | Timber Truss Bridge Maintenance |
| 6-640 | Bridge Piling Maintenance |
| 6-650 | Timber and Log Structure Maintenance |
| 6-690 | Bridge Railing Maintenance |

Available at:

http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Schedule 21 Maintenance Specifications.pdf

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Cleaning** | May introduce accumulated deleterious substances (sediment, oils, de-icing chemicals, paint chips, treated wood debris) to a watercourse | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). Deleterious substances include, but are not limited to, gasoline, oils, paint, concrete leachate, sediment, and chlorinated water. |
| | May disrupt flow, damage habitat and kill fish through the extraction of water for cleaning | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No destruction of fish by any means other than fishing, except as authorized by the *Act* or the regulations (*Fisheries Act*, Section 32).<br>No diversion or use of water without a formal approval (through a temporary water use permit or license) under the *Act (Water Act)*. |
| **Repair Works** | May cause erosion of watercourse banks and generation of sediment if bridge abutments are not protected from draining wash water | No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7).<br>No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)). |
| | May disturb birds and their nests on bridge structures | No injury, molestation or destruction of a bird, its egg, and occupied nest, or the nest (occupied or otherwise) of an eagle, Peregrine Falcon, Gyrfalcon, Osprey, or heron, unless the species is listed under Schedule C as exempt from this protection (*Wildlife Act*, Section 34).<br>No killing, capturing, injuring, taking or disturbing migratory birds or damaging, destroying, removing or disturbing their nests, unless permitted under the *Act (Migratory Birds Convention Act)*. |
| | May release deleterious substances (sediment, cement-based products, wood preservatives, epoxies, mineral oils, sealants( to a watercourse | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). Deleterious substances include, but are not limited to, gasoline, oils, paint, concrete leachate, sediment, and chlorinated water. |
| | May disturb instream and riparian habitat by changing the channel structure, banks, substrate, or vegetation | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by a *Water Act* approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7). |

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Repair Works** | May disturb wildlife species (e.g., birds, beavers) | No injury, molestation or destruction of a bird, its egg, and occupied next, or the next of an eagle, Peregrine Falcon, Gyrfalcon, Osprey, heron, or Burrowing Owl, unless the species is listed under Schedule C as except from this protection (*Wildlife Act*, Section 34).<br>No killing, capturing, injuring, taking or disturbing migratory birds or damaging, destroying, removing or disturbing their nests, unless permitted under the *Act (Migratory Birds Convention Act)*.<br>No disturbance, molestation or destruction of a beaver house or den, unless undertaken to provide irrigation or drainage under lawful authority for the protection of property, or if the action is authorized by regulation (*Wildlife Act*, Section 9). |
| **Painting** | May contaminate surface waters, groundwater, and soils through improper storage or disposal of materials | Disposal of all waste materials in accordance with the *Act* and reporting of any hazardous materials spills (*Waste Management Act*, Special Wastes Regulation). |
| | May release deleterious substances such as sediment, paints, sealants, or other chemicals to a watercourse | No release of any substance that could be deleterious (toxic) to fish or fish habitat. Deleterious substances include, but are not limited to, gasoline, oils, paint, concrete leachate, sediment, and chlorinated water (*Fisheries Act*, Sections 34(1) and 36(3)). |
| | May contaminate surface waters, groundwater, and soils through improper storage and disposal of materials | Disposal of all waste materials in accordance with the *Act* and reporting of any hazardous materials spills (*Waste Management Act*, Special Wastes Regulation) |

## Environmental Best Practices

The following BPs are provided as guidelines to help you ensure your works are completed in compliance with the performance standards and environmental legislation. Please note that the general BPs provided apply for most work activities within this category; if BPs specific to the activity are available they are also noted below.

### Regulatory Agency Contact

- Prior to beginning your bridge management activities, identify any sensitive habitat areas including watercourses—streams, lakes and marine foreshores—found within your work area.
- Determine how much impact your required works will have on the identified areas. Are you undertaking small-scale routine bridge deck patching or large-scale repairs to bridge abutments? What types of materials will you be using? If you are planning to clean a bridge structure, where will you obtain any water used for rinsing the structure?

By asking these questions, you should be able to identify any planned works that may be of concern to regulatory agencies.

- Meet with the appropriate regulatory agency contact, as listed in Section 8, to discuss site-specific environmental protection measures. Refer to Section 7 for information on the Memorandum of Understanding with MoE and the recommended protocol for maintaining regular communications with regulatory agencies.

### Timing of Works

For most work activities within this category, the following general BPs apply:

- Works are preferably undertaken during periods of dry weather (e.g., summer) as this allows easier control of sediment. Typically this is also a less sensitive period for fish and wildlife than other seasons. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances.

- If your maintenance activities require work instream, you must schedule them to coincide with your region's instream work window. Contact your local MoE and DFO offices for further information on timing windows in your District.

#### Bridge Cleaning:

- Schedule bridge-cleaning activities to coincide with the watercourse's spring freshet when possible.

- If works are planned outside the freshet or if your region does not experience a freshet, discuss your protocol and the timing of these works with your local DFO and MoE Habitat Officers

### Site Management

- When preparing your worksite and undertaking your maintenance works, minimize vegetation-clearing activities.

- When your works involve the disturbance of soils or the use of erodible materials (e.g., sands, topsoil), prevent the transport of sediment through the installation of appropriate erosion and sediment control BPs and devices.

### Materials Storage

- Use temporary covers to keep erodible construction materials dry if they are stored on site near watercourses.

- Store hazardous materials in accordance with applicable regulations and ensure that deleterious substances are handled with care.

- Mix concrete compounds, sealants and paints off the bridge and away from any watercourse.

### Why Clean Bridges in the Rain?

Sediment is considered a deleterious substance when it has a negative impact on a receiving watercourse. At freshet or during periods of high flow a large watercourse will often have its highest background levels of sediment. At this time, the introduction of a small amount of sediment to a watercourse (from bridge cleaning) will have a lower risk of potential impact when considered against those high natural background levels.

### DFO Operational Statement – Bridge Maintenance

DFO has developed a series of "Operational Statements" (OS) to streamline the regulatory review of low risk activities completed in and around water. Each OS outlines measures and conditions that must be implemented to be compliant with Subsection 35(1) of the *Fisheries Act* (i.e., no harmful alteration, disruption and destruction (HADD) of fish habitat).

There is an OS for Bridge Maintenance which you can access at: (http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/operational_statements_e.htm)

- Clean tools and equipment off-site to prevent the release of wash water that may contain deleterious substances.
- Ensure all equipment used on site is well maintained and free of fluid leaks.

### Waste and Materials Containment

- Have a spill response plan in place and spill kits on site.
- If potentially deleterious materials (e.g., cement-based products) are used for repair works, ensure raw material and wash water will not be released to any watercourse.
- Where possible, sweep up loose material or debris. Any material thought to pose a risk of contamination to soils, surface water or groundwater should be disposed of appropriately off-site. Any clean material should be removed to an area where it will not enter any watercourse, ditch, or channel.
- For larger works or sites with greater sensitivity, suggested techniques to help prevent wash water and construction and maintenance debris entering the watercourse include: building forms around the work area, hanging tarps to trap loose material, and (for inert substances and debris) using booms on surface waters below work areas to trap and remove any floating substances that may escape the primary containment system.
- Inspect tarps, drain blocks, and wash water runoff areas regularly to ensure they are functioning. Repair as required.

#### Bridge Cleaning:

- Dry sweep and collect loose material off bridge surfaces before washing the bridge.
- Use water alone. If your cleaning activities require degreasers or any other chemical, approval for use must be obtained from DFO and MoE staff.
- If superstructure cleaning is undertaken above or on the bridge deck level, prevent potentially harmful materials from entering into road drains. Block deck drains with suitable barriers (e.g., polyethylene or drain blocks) to prevent direct discharge to a watercourse.
- Contain any wash water or runoff to the bridge deck. Direct wash water towards the bridge approaches and away from the watercourse, then to a vegetated area or contained settling area (e.g., dry ditch channel unconnected to a watercourse) where it can infiltrate.
- If dry sweeping is not feasible for the surface to be cleaned, discussion with local regulatory agencies will be required should the work plan calls for a flushing of materials off the bridge and directly into the watercourse.

### Bridge and Birds...

Some bridges may provide nesting habitat for birds. Most active bird nests, eggs and young are protected under Section 34 of the *Wildlife Act* and cannot be harmed. Raptor nests (including those of eagles, Peregrine Falcons, Gyrfalcons, Osprey, herons or Burrowing Owls) are protected at all times of year.

Several species of common birds (crows, Black-billed Magpies, European Starlings, House Sparrows, Rock Doves, and Black-headed Cowbirds) are listed in Schedule C of the *Wildlife Act* as exempt from the protection of the *Act*. You may remove such birds, their nests or young as part of your works.

If your bridge maintenance works require the removal of a nest of a species other than those listed in Schedule C, you will need to obtain a *Wildlife Act* exemption permit from the MoE.

Contact the Permits and Authorizations Service Bureau (http://www.env.gov.bc.ca/pasb/applications.html) or your local Conservation Officer for more information.

### Water Extraction

The DFO document, Freshwater Intake End-of-Pipe Fish Screen Guidelines, is available at http://www.dfo-mpo.gc.ca/Library/223669.pdf

### Treated Wood Product Information

The DFO document, Guidelines to protect fish and fish habitat from treated wood used in aquatic environments in the Pacific Region, is available at http://www.wwpinstitute.org/pdffiles/treatedwoodguidelines.pdf

### Impacts of Cement-based Products

One litre of concrete washwater or leachate in 1000L of water will kill fish. Cement-based products including grouts and concrete are lethal to fish and many other aquatic organisms. Raw product or leachate entering a watercourse will alter water chemistry, making it more basic or alkaline.

- If water for cleaning is extracted from a watercourse, a short-term water use approval must be obtained from the BC Ministry of Environment (http://www.env.gov.bc.ca/wsd/water_rights/licence_application/section8/index.html). On fish-bearing watercourses, the pump intake must be screened to specifications outlined in DFO's fish screening directive (http://www.dfo-mpo.gc.ca/Library/223669.pdf).

**Repairs Using Treated Wood Products:**

- If treated wood is to be used, ensure it has been treated with a wood preservative appropriate for the project. Certain wood treatments (e.g., creosote) must not be used in or near freshwater.
- If treated timber must be cut to size, ensure cutting takes place away from the bridge and watercourse. Treated sawdust is harmful to aquatic organisms and must be prevented from entering any watercourse.
- Wood preservatives should not be applied over water

**Repairs Using Cement-based Products:**

- If cement-based products are used for repairs of structures in or near water (i.e., bridge abutments) strict protocols must be followed to prevent the introduction of raw product or wash water to a watercourse. The concrete works should be isolated from water with a waterproof barrier (e.g., polyethylene sheets and wood forms or sealed sandbag coffer dams) to prevent leachate generation and contain leachate and raw materials for the duration of the product curing period (a minimum of 72 hrs).
- If your repair works are small and in areas away from the wetted portion of the watercourse, isolation of the site is as simple as ensuring that any wash water generated from the repaired area is prevented from entering bridge drains and watercourses.

**Bridge and Structure Painting:**

- Lead-based paints and the abrasives used to remove them may be considered hazardous wastes. Lead paint removal requires special equipment and procedures for the containment, storage, transportation and treatment of lead-based paint waste. If your works will involve the removal of lead-based paint, please consult the Worker's Compensation Board and the Ministry of Environment Water Quality Best Management Practices Compendium Website (http://www.env.gov.bc.ca/wat/wq/nps/BMP_Compendium/nps_bmp.htm).

## Key Information Sources

The documents and websites listed below are recommended resources for bridge structure management. They can provide examples of existing protocols and management strategies, as well as additional information on specific operational BPs (e.g., erosion and sediment control techniques).

### MoT Technical Circulars:

**Crack Sealing Asphalt Pavements** – MoT Technical Circular T-1/99

**Bridge Drainage and Treatment Environmental, Design and Operational Issues** – MoT Technical Circular T-10/08

These and all other MoT Technical Circulars are available at:
http://www.th.gov.bc.ca/publications/Circulars/technical_circulars.asp

### Locally Developed BPs
### (Provide any locally-developed BPs):

- Omineca Region Bridge Washing Guidelines. MoT. 2003.
- Skeena BMPs for Road Maintenance. MoT. 2003. http://www.th.gov.bc.ca/publications/eng_publications/best_practices/bp.pdf
-

### Other Resources:

**Roadway and Bridge Maintenance Water Quality BPs.** Environmental Protection Division, Ministry of Environment.
http://www.env.gov.bc.ca/wat/wq/nps/BMP_Compendium/nps_bmp.htm

**Bridge Maintenance – DFO Pacific Region Operational Statement.** 2008. Fisheries and Oceans Canada (DFO). http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/os-bridge_e.htm

**Clear-Span Bridges – DFO Pacific Region Operational Statement.** 2008. Fisheries and Oceans Canada (DFO). http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/os-clear_span_e.htm

**Guidelines for the protection of fish and fish habitat during bridge maintenance operations in British Columbia.** Samis, S.C., M.D. Nassichuk and B.J. Reid. 1991.
http://www.bieapfremp.org/toolbox/pdfs/guidelines_for_protection_of_fish_and_fish_habitat_during_bridge_maintenance_operations_in_bc.pdf

**Standards and Best Practices for Instream Works.** March 2004. Lower Mainland Region, MoE.
http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf

## Checklist for Environmental Protection Requirements

☐ Is your proposed work considered a "routine" maintenance activity? If not, approvals or permits may be required. Contact your local municipal, provincial, or federal regulatory agency staff.

☐ Has this project been discussed with local environmental regulatory staff? In addition to the BP information presented, other site-specific conditions may apply.

☐ Have site-specific environmental protection requirements been identified? List below:

☐ ______________________________________

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## 5.14 Retaining Structure Management

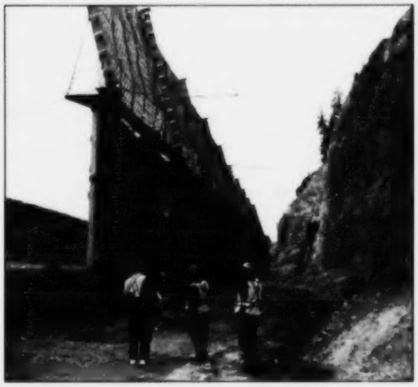
Retaining structure management includes the regular cleaning, maintenance, repair and replacement of highway retaining structures to ensure their continued safe and stable condition.

*Highway Maintenance Specification Sections*

6-660 Retaining Structure Maintenance

Available at:

http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Schedule 21 Maintenance Specifications.pdf



### Environmental Issues

Primary environmental issues relating to routine retaining structure management activities are summarized in the following table. It should be noted that site-specific conditions might present additional issues you will need to address in planning and undertaking your works.

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Cleaning and Debris Removal** | May introduce deleterious substances to nearby watercourses as a result of cleaning and debris removal activities | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). Deleterious substances include, but are not limited to, gasoline, oils, and sediment. |
| | May damage roadside riparian vegetation or other significant habitats through the side casting of debris | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7). |
| | May damage habitat through the improper location of disposal sites in ditches, wetlands, or other significant habitat areas | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by an approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7).<br>No dispersal of noxious weeds or their seeds (*Weed Control Act*, Weed Control Regulation). |

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Repair Works** | May release deleterious substances (sediment, cement-based products, treated wood, wood preservatives, epoxies, mineral oils, sealants) to nearby watercourses | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). Deleterious substances include, but are not limited to, gasoline, oils, sealants, concrete leachate, and sediment. |
| | May disturb instream and riparian habitat adjacent to retaining structures if repair works involve changing the channel structure, banks, substrate, or vegetation | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by a *Water Act* approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7).<br>No dispersal of noxious weeds or their seeds (*Weed Control Act*, Weed Control Regulation). |
| | May contaminate surface waters, groundwater, and soils through improper storage or disposal of materials | Reporting of any polluting substance spills (*Environmental Management Act*, Section 79(5)) and disposal of all waste materials in accordance with the *Act* (*Environmental Management Act*, Waste Disposal Regulation). |

## Environmental Best Practices

The following BPs are provided as guidelines to help you ensure your routine works are completed in compliance with the performance standards and environmental legislation. Please note that the general BPs provided apply for most work activities within this category; if BPs specific to the activity are available they are also noted below.

### Regulatory Agency Contact

- Prior to beginning your bridge management activities, identify any sensitive habitat areas including watercourses—streams, lakes and marine foreshores—found within your work area.
- Determine how much impact your required works will have on the identified areas. Are you undertaking small-scale debris removal behind a retaining structure or larger-scale repairs to address stability concerns? What types of materials will you be using? By asking these questions, you should be able to identify any planned works that may be of concern to regulatory agencies.
- Meet with the appropriate regulatory agency contact, as listed in Section 8, to discuss site-specific environmental protection measures. Refer to Section 7 for information on the Memorandum of Understanding with MoE and the recommended protocol for maintaining regular communications with regulatory agencies.

### Timing of Works

For most work activities within this category, the following general BPs apply:

- Works are preferably undertaken during periods of dry weather (e.g., summer) as this allows easier control of sediment. Typically this is also a less sensitive period for fish and wildlife than other seasons. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances.
- If your maintenance activities require work instream, you must schedule them to coincide with your region's instream work window. Contact your local MoE and DFO offices for further information on timing windows in your District.

### Site Management

- When preparing your worksite and undertaking your maintenance works, minimize vegetation-clearing activities.
- When your works involve the disturbance of soils or the use of erodible materials (e.g., sands, topsoil), prevent the transport of sediment through the installation of appropriate erosion and sediment control BPs and devices. Some suggested options include the temporary placement of silt fencing between disturbed areas of slopes and watercourses or drainage areas and the seeding of exposed soils.

### Materials Storage

- Use temporary covers to keep erodible construction materials dry if they are stored on site near watercourses.
- Store hazardous materials in accordance with applicable regulations and ensure that deleterious substances are handled with care.
- Mix concrete compounds, sealants and paints away from any watercourse.
- Clean tools and equipment off-site to prevent the release of wash water that may contain deleterious substances.
- Ensure all equipment used on site is well maintained and free of fluid leaks.

### Waste and Materials Containment

- Have a spill response plan in place and spill kits on site.
- If potentially deleterious materials (e.g., cement-based products) are used for repair works, ensure raw material and wash water will not be released to any watercourse. Suggested techniques to help prevent wash water and construction and maintenance debris entering the watercourse include: building forms around the work area, hanging tarps to trap loose material, and (for inert substances and debris) using

booms on surface waters below work areas to trap and remove any floating substances that may escape the primary containment system.

- Inspect containment structures regularly to ensure they are functioning. Repair as required.
- Where possible, sweep up loose material or debris. Any material thought to pose a risk of contamination to soils, surface water or groundwater should be disposed of appropriately off-site. Any clean material should be removed to an area where it will not enter any watercourse, ditch, or channel.

**Repairs Using Treated Wood Products:**

- If treated wood is to be used, ensure it has been treated with a wood preservative appropriate for the project. Certain wood treatments (e.g., creosote) must not be used in or near freshwater.
- If treated timber must be cut to size, ensure cutting takes place away from the bridge and watercourse. Treated sawdust is harmful to aquatic organisms and must be prevented from entering any watercourse.
- Wood preservatives should not be applied over water

**Repairs Using Cement-based Products:**

- If cement-based products are used for repairs of structures in or near water (i.e., bridge abutments) strict protocols must be followed to prevent the introduction of raw product or wash water to a watercourse. The concrete works should be isolated from water with a waterproof barrier (e.g., polyethylene sheets and wood forms or sealed sandbag coffer dams) to prevent leachate generation and contain leachate and raw materials for the duration of the product curing period (a minimum of 72 hrs).
- If your repair works are small and in areas away from the wetted portion of the watercourse, isolation of the site is as simple as ensuring that any raw material or wash water generated from the repaired area is prevented from entering all watercourses.

## Key Information Sources

The documents and websites listed below are recommended resources for retaining structure management. They can provide examples of existing protocols and management strategies, as well as additional information on specific operational BPs (e.g., erosion and sediment control techniques).

### MoT Technical Circulars:

There are no relevant Technical Circulars authored to-date for this activity.

All Technical Circulars are available at:
http://www.th.gov.bc.ca/Publications/Circulars/Current_technical.asp

### Locally Developed BPs
### (Provide any locally-developed BPs):

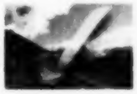
-
-
-
-

### Other Resources:

**Standards and Best Practices for Instream Works.** March 2004. Lower Mainland Region, MoE.
http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf

**General Best Management Practices to Protect Water Quality website.** June 2004. Environmental Protection Division, Ministry of Environment.
http://www.env.gov.bc.ca/wat/wq/nps/BMP_Compendium/nps_bmp.htm

**Catalogue of Stormwater Best Management Practices.** September 2005. Idaho Department of Environmental Quality.
http://www.deq.state.id.us/water/data_reports/storm_water/catalog/index.cfm



### Checklist for Environmental Protection Requirements

☐ Is your proposed work considered a "routine" maintenance activity? If not, approvals or permits may be required. Contact your local municipal, provincial, or federal regulatory agency staff.

☐ Has this project been discussed with local environmental regulatory staff? In addition to the BP information presented, other site-specific conditions may apply.

☐ Have site-specific environmental protection requirements been identified? List below:

☐ ____________________

☐ ____________________

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*Highway Maintenance Specification Sections*

6-680 Multiplate Structure Maintenance

Available at:

http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Schedule 21 Maintenance Specifications.pdf

## 5.15 Multiplate Structure Maintenance

Multiplate structures, including culverts and arches, require routine maintenance to ensure they allow unimpeded flow. Multiplate structure management activities include the replacement or repair of multiplate components such as bolts, plates, aprons, and headwalls, and the placement or repair of scour and erosion protection structures.

### Environmental Issues

Primary environmental issues relating to routine multiplate structure management activities are summarized in the following table. It should be noted that site-specific conditions might present additional issues you will need to address in planning and undertaking your works.

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Repair Works** | May release deleterious substances (sediment, cement-based products, epoxies, sealants) to a watercourse | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). Deleterious substances include, but are not limited to, gasoline, oils, sealants, concrete leachate, and sediment. |
| | May disturb instream and riparian habitat by changing the channel structure, banks, substrate, or vegetation | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by a *Water Act* approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7). |
| | May contaminate surface waters, groundwater, and soils through improper storage or disposal of materials | Reporting of any polluting substance spills (*Environmental Management Act*, Section 79(5)) and disposal of all waste materials in accordance with the *Act* (*Environmental Management Act*, Waste Disposal Regulation). |

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Placement of Riprap** | May harmfully alter channel structures through the placement of riprap materials | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by a *Water Act* approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7). |
| | May introduce sediment or other deleterious substances to a watercourse through site preparation for riprap placement or the placement of silt-laden riprap materials | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). Deleterious substances include, but are not limited to, gasoline, oils, concrete leachate and sediment. |

## Environmental Best Practices

The following BPs are provided as guidelines to help you ensure your routine works are completed in compliance with the performance standards and environmental legislation. Please note that the general BPs provided apply for most work activities within this category; if BPs specific to the activity are available they are also noted below.

### Regulatory Agency Contact

- Prior to beginning your bridge management activities, identify any sensitive habitat areas including watercourses – streams, lakes and marine foreshores, found within your work area.

- Determine how much impact your required works will have on the identified areas. Are you undertaking small-scale routine activities like bolt replacement outside a wetted channel or large-scale concrete repairs to the bed of the multiplate structure? What types of materials will you be using? By asking these questions, you should be able to identify any planned works that may be of concern to regulatory agencies.

- Meet with the appropriate regulatory agency contact, as listed in Section 8, to discuss site-specific environmental protection measures. Refer to Section 7 for information on the Memorandum of Understanding with MoE and the recommended protocol for maintaining regular communications with regulatory agencies.

### Timing of Works

For most work activities within this category, the following general BPs apply:

- Works are preferably undertaken during periods of dry weather (e.g., summer) as this allows easier control of sediment. Typically this is also a less sensitive period for fish and wildlife than other seasons. If the work schedule requires working in the rain, the area of work must be isolated and appropriate sediment controls must be installed to prevent the release of sediment-laden water or any other deleterious substances.

- If your maintenance activities require work instream, you must schedule them to coincide with your region's instream work window. Contact your local MoE and DFO offices for further information on timing windows in your District.

### Site Management

- When preparing your worksite and undertaking your maintenance works, minimize vegetation-clearing activities.
- When your works involve the disturbance of soils or the use of erodible materials (e.g., sands, topsoil), prevent the transport of sediment through the installation of appropriate erosion and sediment control BPs and devices.

### Worksite Isolation

- Isolate your work area from any flowing water that may be present. Ensure any flows are temporarily diverted (using a pump, flume or other diversion) around the portion of the watercourse where you are working.
- Contain any sediment-laden water generated during your works in your isolated work cell. Use a pump to draw sediment-laden water out of the work cell and discharge it to a level vegetated area where sediment can settle as the water infiltrates the ground.

### Waste and Materials Containment

- Store hazardous materials in accordance with applicable regulations and ensure that deleterious substances are handled with care.
- Have a spill response plan in place and spill kits on site.
- Ensure all equipment used on site is well maintained and free of fluid leaks.
- Clean tools and equipment off-site to prevent the release of wash water that may contain deleterious substances.
- Mix concrete compounds, sealants and paints away from any watercourse.
- If potentially deleterious materials (e.g., cement-based products) are used for repair works, ensure raw material and wash water will not be released to any watercourse. Suggested techniques to help prevent wash water and construction and maintenance debris entering the watercourse include: building forms around the work area, hanging tarps to trap loose material, and (for inert substances and debris) using booms on surface waters below work areas to trap and remove any floating substances that may escape the primary containment system.

**DFO Operational Statements:**

- Culvert Maintenance

DFO has developed a series of "Operational Statements" (OS) to streamline the regulatory review of low risk activities completed in and around water. Each OS outlines measures and conditions that must be implemented to be compliant with Subsection 35(1) of the *Fisheries Act* (i.e., no harmful alteration, disruption and destruction (HADD) of fish habitat).

There are OSs for Culvert Maintenance which you can access at: (http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/operational_statements_e.htm)

- Inspect containment structures regularly to ensure they are functioning. Repair as required.
- Where possible, sweep up loose material or debris. Any material thought to pose a risk of contamination to soils, surface water or groundwater should be disposed of appropriately off-site. Any clean material should be removed to an area where it will not enter any watercourse, ditch, or channel.

### Repairs Using Cement-based Products:

- If cement-based products are used for repairs of structures in or near water (i.e., headwall structures, bed liners, scour protection) strict protocols must be followed to prevent the introduction of raw product or wash water to a watercourse. The concrete works should be isolated from water with a waterproof barrier (e.g., polyethylene sheets and wood forms or sealed sandbag coffer dams) to prevent leachate generation and to contain leachate and raw materials for the duration of the product curing period (a minimum of 72 hrs).

### Erosion and sediment control

- Use temporary covers to keep erodible construction materials dry if they are stored on site near watercourses.
- Install appropriate erosion and sediment control devices (e.g., silt fence installed below disturbed slopes, rock check dams and temporary silt dikes in low velocity, low volume ditches) to prevent the transportation of sediment to downstream watercourses. Ensure that any structures installed are maintained and monitored until they are no longer needed (i.e., vegetative cover on seeded areas is adequate to control erosion).
- Use clean materials, free of fine soils that may contribute sediment to the watercourse, when installing riprap or other scour protection measures.

## Key Information Sources

The documents and websites listed below are recommended resources for multiplate structure maintenance. They can provide examples of existing protocols and management strategies, as well as additional information on specific operational BPs (e.g., erosion and sediment control techniques).

### MoT Technical Circulars:

There are no relevant Technical Circulars authored to-date for this activity.

All Technical Circulars are available at:
http://www.th.gov.bc.ca/Publications/Circulars/Current_technical.asp

**Locally Developed BPs**
**(Fill in with any locally-developed BPs):**

- **Omineca Region Bridge Washing Guidelines.** MoT. 2003.
- **Skeena BMPs for Road Maintenance.** MoT. 2003. http://www.th.gov.bc.ca/publications/eng_publications/best_practices/bp.pdf

**Other Resources:**

**Standards and Best Practices for Instream Works. March 2004.** Lower Mainland Region, MoE. http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf

**Culverts and Fish Passage Fact Sheet.** Oct. 2000. Environmental Management Section, Engineering Branch. Ministry of Transportation. http://www.th.gov.bc.ca/publications/eng_publications/environment/references/Culverts_and_Fish_Passage.pdf

**Culvert Maintenance – Pacific Region Operational Statement.** 2008. Fisheries and Oceans Canada (DFO). http://www-heb.pac.dfo-mpo.gc.ca/decisionsupport/os/os-culvert_maint_e.htm

**Fish Stream Crossing Guidebook.** 2002. Forest Practices Branch, BC Ministry of Forests. http://www.for.gov.bc.ca/tasb/legsregs/fpc/FPCGUIDE/FishStreamCrossing/FSCGdBk.pdf

**General Best Management Practices to Protect Water Quality website.** June 2004. Environmental Protection Division, BC Ministry of Environment. http://www.env.gov.bc.ca/wat/wq/nps/BMP_Compendium/nps_bmp.htm

**Manual of Control of Erosion and Shallow Slope Movement.** August 1997. BC Ministry of Transportation. http://www.th.gov.bc.ca/Publications/eng_publications/environment/references/Man_Control_Erosion.pdf

**Catalogue of Stormwater Best Management Practices.** September 2005. Idaho Department of Environmental Quality. http://www.deq.state.id.us/water/data_reports/storm_water/catalog/index.cfm

## Checklist for Environmental Protection Requirements

☐ Is your proposed work considered a "routine" maintenance activity? If not, approvals or permits may be required. Contact your local municipal, provincial, or federal regulatory agency staff.

☐ Has this project been discussed with local environmental regulatory staff? In addition to the BP information presented, other site-specific conditions may apply.

☐ Have site-specific environmental protection requirements been identified? List below:

☐ ____________________

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## 5.16 Highway Incident and Vandalism Response

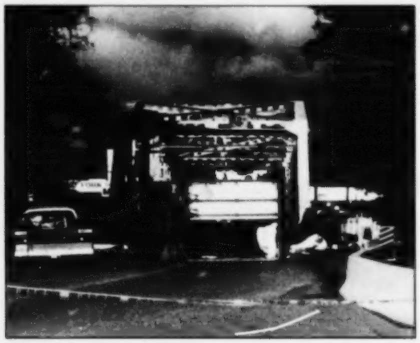
Highway incident and vandalism response activities include responding to motor vehicle accidents, removing vehicles and debris from the road, and assisting with materials spills. Such activities are required to protect the driving public from unsafe road conditions. Emergency response is often an activity coordinated with local law enforcement or other first-response agencies.

*Highway Maintenance Specification Sections*

7-780 Highway Incident and Vandalism Response

Available at:

http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Schedule 21 Maintenance Specifications.pdf



### Environmental Issues

Primary environmental issues relating to routine highway incident and vandalism response activities are summarized in the following table. It should be noted that site-specific conditions might present additional issues you will need to address in planning and undertaking your works.

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Clean-up and Removal of Vehicles and Spilled Materials** | May introduce deleterious substances to a watercourse | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). |
| | May contaminate surface waters, groundwater, and soils through improper storage or disposal of abandoned vehicles or materials | Reporting of any polluting substance spills (*Environmental Management Act*, Section 79(5)) and disposal of all waste materials in accordance with the *Act* (*Environmental Management Act*, Waste Disposal Regulation).<br>Removal of abandoned vehicles and things in an appropriate manner (*Transportation Act*). |

### Environmental Best Practices

The following BPs are provided as guidelines to help you ensure your routine works are completed in compliance with the performance standards and environmental legislation. Please note that the general BPs provided apply for most work activities within this category; if BPs specific to the activity are available they are also noted below.

### Regulatory Agency Contact

- Coordinate response with regulatory agencies, police and the Province in accordance with your established protocols.

### Spill Response

- As part of your responsibility to contain spills on highways in conjunction and cooperation with regulatory agencies, police authorities and the Province:
- Prevent all potentially harmful materials from entering into road drains and watercourses. Block road drains and construct a containment cell around the spill. Deploy spill kits.
- Apply containment devices as quickly as possible.
- Collect any waste material and dispose of in an approved manner.
- Sweep up contaminated absorbents; don't flush materials into roadside ditches.
- Any soils that have been contaminated by a highway accident may need to be excavated from the site and disposed of in accordance with provincial and federal waste management regulations.
- Ensure that hazardous materials use, storage and disposal is in accordance with the information contained in their Material Safety Data Sheets.
- If you are responding to a highway incident that resulted in the disturbance of soils in an area where there is a chance that sediment could enter a watercourse, install appropriate temporary sediment control devices (e.g., silt fence).

### Emergency Contacts

MoE's Environmental Emergency Management Program can be contacted through the **BC Provincial Emergency Program (PEP) at 1-800-663-3456.**

The Canadian Transport Emergency Centre of the Department of Transportation (CANUTEC) can be contacted for highway incidents involving Dangerous Goods at **1-613-996-6666** (will accept collect calls).

### Materials Management

- Prevent spilled materials and debris from entering into road drains and watercourses during clean-up activities.
- Remove materials to an appropriate storage or disposal site.
- In the case of abandoned vehicle removal, take care to ensure that potentially harmful materials (anti-freeze, gasoline, motor oil, etc.) are contained and prevented from contaminating soils and ground and surface waters. Ensure that the vehicle is transported to an appropriate storage or disposal facility.

### Key Information Sources

The documents and websites listed below are recommended resources for highway incident and vandalism response activities. They can provide examples of existing protocols and management strategies, as well as additional information on specific operational BPs (e.g., erosion and sediment control techniques).

**MoT Technical Circulars:**

There are no relevant Technical Circulars authored to-date for this activity

All Technical Circulars are available at:
http://www.th.gov.bc.ca/Publications/Circulars/Current_technical.asp

**Locally Developed BPs**
**(Provide any locally-developed BPs):**

-
-
-

**Other Resources:**

**Emergency Response Guidebook.** 2004. CANUTEC website.
Transport Canada.
http://www.tc.gc.ca/canutec/en/guide/guide.htm

**Provincial Emergency Program.** Ministry of Public Safety and
Solicitor General.
http://www.pep.bc.ca/

**Abandoned Vehicle Process – *Transportation Act.*** Environmental
Management Section. Engineering Branch. BC Ministry of Transportation.
http://www.th.gov.bc.ca/hired-equipment/hiredequip.htm/
Abandoned_Vehicle_Process.pdf

## Checklist for Environmental Protection Requirements

☐ Is your proposed work considered a "routine" maintenance activity? If not, approvals or permits may be required. Contact your local municipal, provincial, or federal regulatory agency staff.

☐ Has this project been discussed with local environmental regulatory staff? In addition to the BP information presented, other site-specific conditions may apply.

☐ Have site-specific environmental protection requirements been identified? List below:

☐ ______________________________

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## 5.17 Gravel Pit Operations

Gravel pits provide sources of aggregate materials such as rock, stone, gravel, and sand used in many construction or maintenance activities. Pit operations include activities such as mechanical excavating, sorting, crushing, screening and washing of materials. Heavy equipment and vehicles are used to transport materials around the site and from the pit to construction and maintenance sites. Gravel pits typically follow a lifespan from initial site clearing and vegetation removal to pit reclamation and abandonment. Pit operations may extend over several years or decades. Care should be exercised to avoid the potential environmental concerns that arise during these operational periods.

DANGER
OPEN PIT
FALL HAZARD
PRIVATE PROPERTY

### Environmental Issues

Primary environmental issues relating to gravel pit operations associated with routine highway maintenance activities are summarized in the following table. It should be noted that site-specific conditions might present additional issues you will need to address in planning and undertaking your works.

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Gravel Excavation and Processing** | May release deleterious substances (sediment, sediment-laden waters) to a watercourse | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). Deleterious substances include sediment. |
| | May release fine sediment and particulate matter to air | Control of fugitive dust to avoid air quality impacts in accordance with local bylaws.<br>Provincial environmental objectives include air quality criteria for the 10 micrometer particulate fraction (PM10) generated by aggregate dust – a 24-hour average PM10 less than 50 µg/m3 (BC Ambient Air Quality Objectives). |

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Noxious Weed / Invasive Plant Control**<br>*(See Section 5.10)* | Gravel pits may become a source of invasive plants and the transport of aggregate material may contribute to the spread of noxious weeds | Control of invasive plants and no dispersal of noxious weeds or their seeds (*Weed Control Act*, Weed Control Regulation). |
| | May introduce sediment or other deleterious substances to a watercourse when chemicals, mechanical, or biocontrol management methods are implemented | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)).<br>No alteration of a stream unless authorized by a *Water Act* approval, licence, or order (*Water Act*, Section 9), or through a Notification (*Water Act* Regulation, Part 7).<br>No use, handling, release, transport, storage, or disposal of a pesticide in a manner that causes or is likely to cause an unreasonable adverse effect (*Integrated Pest Management Act* and Regulations). |
| | May disturb riparian vegetation | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)). |
| **Carcass Disposal in Gravel Pits** | May cause a threat to both wildlife and public safety through the attraction of wildlife to highway rights-of-way and storage locations | Disposal and storage of carcasses in a manner that will not attract dangerous wildlife (*Wildlife Act*, local bylaws) |
| | May pose a threat of disease through improper storage or disposal of roadkill | Disposal and storage of carcasses in accordance with local public health regulations and bylaws. |
| | May contaminate surface waters, groundwater, and soils through improper storage or disposal of materials | Disposal of all waste materials in accordance with the *Act* and reporting of any hazardous materials spills (*Waste Management Act*, Special Wastes Regulation). |

## Environmental Best Practices

The following BPs are provided as guidelines to help you ensure your routine works are completed in compliance with the performance standards and environmental legislation. Please note that the general BPs provided apply for most work activities within this category; if BPs specific to the activity are available they are also noted below.

### Regulatory Agency Contact

- Work with your local regulatory agencies to establish a protocol for the disposal of noxious weeds/invasive plants in your area.

### Site Management

- Gravel pit excavation and operation create areas of exposed soils where there is the potential for sediment to be transported to a watercourse. Care is needed to design and install appropriate erosion and sediment controls that provide adequate settling times when fine sediment is a component of the gravel deposit.

- Temporarily inactive areas of exposed soils susceptible to erosion should be stabilized through the use of short-term (e.g., polyethylene sheeting) or longer-term (e.g., establishment of vegetation) cover. Soil amendments (e.g., compost) can be used to support plant covers.
- Gravel pit operations typically leave large disturbed areas that lack natural cover and medium for plant growth. Native plants face challenges to growth in these area and many noxious weeds and invasive plants which have broader habitat tolerances are able to colonize and persist.

### Noxious Weed/Invasive Plant Control

- Regularly inspect the gravel pit area for noxious weed/invasive plant material. Noxious weeds/invasive plants may establish from adjacent areas or may spread from onsite dumping of materials that contain invasive plants or their seeds.
- Where noxious weeds/invasive plants are identified, avoid transporting gravel or soil as seeds are likely present. Equipment entering the area can also contribute to dispersal of invasive plant material.
- Record and report infestations to MoT Gravel Managers so that appropriate controls can be implemented.
- Select appropriate plant removal methods specific to the noxious weed/invasive plant species (see the T.I.P.S. publications created by the Invasive Plant Council of British Columbia).
- Ensure all noxious weed/invasive plant materials are disposed of in accordance with the *Integrated Pest Management Act* and its Regulations, *Weed Control Act* Regulations and any local area protocols. For example, use a covered container to transport noxious weeds/invasive plants and take care to clean any vehicle or equipment used in the removal of noxious weed/invasive plants when it leaves the work area.
- When using chemical or biological controls to treat noxious weeds/invasive plants within the gravel pit, confirm the control agent's safety for aquatic species where runoff may enter a stream or wetland. Use safe materials handling measures as directed by the product manufacturer.

### Erosion and sediment control

- Gravel pit operation requires that soils be exposed and excavated. Without the protective cover of vegetation, sediment will be eroded by wind, rain, or surface runoff from snowmelt. The management of erosion and sediment within a gravel pit becomes a particular concern near watercourses, in small pits without adequate space for settling ponds, and in windy areas where sediments are fine enough to become airborne.

- Within the gravel pit, minimize excavation or storage of erodible materials near watercourses. Store piles on flat areas and collect local drainage in settling ponds. Use control measures (i.e., temporary covers, grading and seeding, installation of silt fence around stock piles) to contain sediment safely within the gravel pit.
- Ensure that all sediment control structures are installed, maintained and monitored regularly until they are no longer needed.
- Following completion of the gravel pit or cessation of its use, reclaim the site by redistributing stockpiled topsoil and re-establishing vegetative cover using native species. A stable drainage network must also be constructed.

## Key Information Sources

The documents and websites listed below are recommended resources for roadside vegetation management. They can provide examples of existing protocols and management strategies, as well as additional information on specific operational BPs (e.g., erosion and sediment control techniques).

**MoT Technical Circulars:**

**Removal of Gravel from MoT Pits by Third Parties** – MoT Technical Circular T-1/91

**Use of Explosives in or near Fish and fish Habitat** – MoT Technical Circular T-03/00

**ARD Testing at Quarry and Rock Cut Sites** – MoT Technical Circular T-10/04

These and all other MoT Technical Circulars available at:
http://www.th.gov.bc.ca/Publications/Circulars/Current_technical.asp

**Locally Developed BPs**
**(Provide any locally-developed BPs):**

- 
- 
-

**Other Resources:**

**Aggregate Operators Best Management Practices Handbook for British Columbia**
http://www.empr.gov.bc.ca/Mining/MineralStatistics/MineralSectors/ConstructionAggregates/ReportsandPublications/Pages/AggregateOperators.aspx

**Gravel License – Schedule 13 – Current Maintenance Agreement Schedules – Highway Maintenance Contracts.** 2008. BC Ministry of Transportation and Infrastructure.
http://www.th.gov.bc.ca/BCHighways/contracts/maintenance/Maintenance_Agreements/SCHEDULE-13_10-Jan-06.pdf

**Reclamation & Environmental Protection Handbook for Sand, Gravel & Quarry Operations in BC.** 1995. Ministry of Energy, Mines and Petroleum Resources; Ministry of Transportation and Highways; and Natural Resources Canada.

**Disturbed Ecosystems Quarries, Gravel Pits, Barren Land Fact Sheet #11.** Biodiversity Conservation Strategy for the Greater Vancouver Region.
http://public.metrovancouver.org/about/publications/Publications/BiodiversityFactSheetEstuary.pdf

**T.I.P.S.: Targeted Invasive Plant Solutions.** 2007. Invasive Plant Council of British Columbia.
http://www.invasiveplantcouncilbc.ca/resources/targeted-invasive-plant-solutions-tips

***BC Weed Control Act:* Noxious Weeds in BC Website.** Pest Management, Ministry of Agriculture and Lands.
http://www.agf.gov.bc.ca/cropprot/noxious.htm

**"Dangerous Travelers" Invasive Plant Control Video**
http://www.fs.fed.us/invasivespecies/prevention/dangeroustravelers.shtml

## Checklist for Environmental Protection Requirements

☐ Is your proposed work considered a "routine" maintenance activity? If not, approvals or permits may be required. Contact your local municipal, provincial, or federal regulatory agency staff.

☐ Has this project been discussed with local environmental regulatory staff? In addition to the BP information presented, other site-specific conditions may apply.

☐ Have site-specific environmental protection requirements been identified? List below:

☐ ____________________

☐ ____________________

☐ ____________________

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# 6 Supplementary Best Practices for General Operations

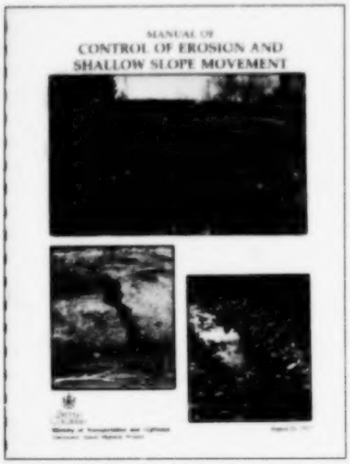
In addition to the specific highway maintenance activities described in the preceding pages, the Ministry's maintenance contractors mav also undertake or accommodate other maintenance activities associated with general highway operations. The following BPs apply to several topic areas that are not specific to a particular maintenance activity.

As with the BPs developed for specific maintenance activities, these supplementary BPs provide a starting point to ensure work can be completed in a manner that is compliant with environmental legislation. Other documents and resources are available which have more detailed information and these are referenced and linked throughout the following sections. Appropriately qualified professionals may also provide additional advice.

The implementation of these best practices support, in a broad manner, any guideline developed for individual activities.

## 6.1 Erosion and Sediment Control

Many highway maintenance activities involve the disturbance of ground surfaces. These activities can cause erosion of soils and the release of sediment which must be managed.



MANUAL OF
CONTROL OF EROSION AND
SHALLOW SLOPE MOVEMENT

### Environmental Issues

Primary environmental issues relating to the management of erosion and sediment generated from highway maintenance activities are summarized in the following table. It should be noted that site-specific or activity–specific conditions (e.g., topography, weather) may present additional issues you will need to address in planning and undertaking your works.

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Excavation** | May introduce sediment or other deleterious substances to a watercourse through erosion and transport from areas of newly disturbed soils occurring in excavations and/or stockpiles | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). |
| | May release fine sediment and particulate matter to air | Control of fugitive dust to avoid air quality impacts in accordance with local bylaws.<br>Provincial environmental objectives include air quality criteria for the 10 micrometer particulate fraction (PM10) generated by aggregate dust—a 24-hour average PM10 less than 50 µg/m3 (BC Ambient Air Quality Objectives). |

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Fills** | May introduce sediment or other deleterious substances to a watercourse through erosion and transport from newly placed or disturbed soils | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). |
| | May release fine sediment and particulate matter to air | Control of fugitive dust to avoid air quality impacts in accordance with local bylaws.<br>Provincial environmental objectives include air quality criteria for the 10 micrometer particulate fraction (PM10) generated by aggregate dust–a 24-hour average PM10 less than 50 µg/m3 (BC Ambient Air Quality Objectives). |
| **Grading** | May introduce sediment or other deleterious substances to a watercourse through erosion and transport from areas of newly disturbed soils | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). |
| | May release fine sediment and particulate matter to air | Control of fugitive dust to avoid air quality impacts in accordance with local bylaws.<br>Provincial environmental objectives include air quality criteria for the 10 micrometer particulate fraction (PM10) generated by aggregate dust–a 24-hour average PM10 less than 50 µg/m3 (BC Ambient Air Quality Objectives). |

## Environmental Best Practices

The following BPs are provided as guidelines to help you ensure your routine works are completed in compliance with the performance standards and environmental legislation. Please note that the BPs provided below generally apply to most work activities. However, BPs specific to certain activities are described in earlier sections of this document.

### Regulatory Agency Contact

- Identify any sensitive habitat areas, including wetted ditches and natural watercourses—streams, lakes and marine foreshores, found within your work area. Determine how much impact your required works will have on the identified areas and if any specialized erosion and sediment protection measures are required. Are you planning to re-grade a non-vegetated roadside drainage ditch that only conveys storm water? Are you required to remove debris jams from a permanently wetted fish-bearing watercourse that crosses the highway right-of-way? What type of equipment and materials are you planning to use to stabilize a large lakeside section of highway embankment that has been damaged by erosion? Are there any areas within your jurisdiction prone to regular debris accumulations or erosion issues? By asking these questions, you should be able to identify any planned works or areas that may be of concern to regulatory agencies.

- Meet with the appropriate regulatory agency contact, as listed in Section 8, to discuss site-specific environmental protection measures. Refer to Section 7 for information on the Memorandum of Understanding with MoE, and the recommended protocol for maintaining regular communications with regulatory agencies.

### Timing of Works

#### Erosion Prevention

- Plan proactively for erosion and sediment control. Prior to beginning work, anticipate what techniques will be needed by your maintenance activity and arrange for needed materials.

- Manage potential erosion before it becomes a problem. Sediment controls have a limited capacity to remove mobilized sediment and should be used to support well-planned and properly installed erosion controls.

#### Sediment Control

- Vegetative covers take time to establish; install them early in the growing season to support their growth.

- Installation of controls, like most works, is preferably undertaken during periods of dry weather (e.g., summer) as this allows easier control of sediment. Typically this is also a less sensitive period for fish and wildlife than other seasons. If unfavourable weather is the driver for the installation of additional controls, plan to use prefabricated and easily installed control structures to reduce the potential for sediment release from the controls themselves.

- If your erosion and sediment controls have the potential to interrupt fish passability (e.g., within seasonally wetted channels or crossings), you must schedule their use and removal to coincide with your region's instream work window. Contact your local MoE and DFO offices for further information on timing windows in your District.

### Site Management

#### Preservation of Vegetation

- Retain existing vegetation and ground cover where possible to limit areas of exposed soils which may be transported to watercourses through overland flow.

- Restrict vehicle or equipment access to paved or surfaced areas to minimize disruption of existing site vegetative cover.

#### Erosion Control

- To reduce erosion potential, convey surface runoff through swales or drainages designed to minimize flow velocity and erosion, while maximizing settling potential. Use trenched silt fences or earthen berms to direct surface runoff away from exposed soils.

- Completely cover temporary stockpiles or erodible material with polyethylene or tarps to control loss of material by rainfall impact.
- Revegetate finished construction areas.

### Sediment Control

- Install silt fencing around stockpiles, at the top of banks of disturbed slopes and around areas of disturbance to reduce the potential for transportation of sediment to watercourses.
- Filter fabric bags may be temporarily installed inside catch basins, or other runoff collection structures to contain sediment transported from the work area.
- Where possible, collect runoff into a suitable sediment settling pond or trap prior to discharge off-site.
- Contain any sediment-laden water generated during your works in an isolated work cell. Use a pump to draw sediment-laden water out of the work cell and discharge it to a level vegetated area where sediment can settle as the water infiltrates the ground.

### Re-vegetation

- Re-vegetate exposed soils as quickly as possible, and use plant species that are native and/or adapted to the area to aid in site stabilization, long-term erosion and sediment control, and invasive plant control.
- Replace any vegetation removed within 15 m of the top of bank of a drainage course that has fish habitat values. Trees and shrubs used for re-vegetation should be species native to the area.
- Hydroseeding with mulch or dry seeding with a covering of straw or compost is an effective technique for quickly establishing a protective grass cover. Where seeding is impractical but surface protection is needed, consider straw mulching, erosion blankets, or other covering for interim surface erosion control.
- Refer to MoT's Standard Specification for Highway Construction 757 – Re-vegetation Seeding, which provides MoT's standard seed mixes and quality standards.

### Monitoring and Maintenance

- Check for signs of erosion (e.g., formation of rills and gullies, slumping, the presence of sediment-laden runoff water) on slopes and banks, particularly after storm events.
- Clean accumulated sediment from filter fabric bags and the base of silt fences.
- To continue to prevent the movement of sediment to nearby watercourses, ensure that all sediment control structures are installed, maintained and monitored until they are no longer needed.

- Regularly collect loose material and sediment accumulating within your work area.

## Key Information Sources

The documents and websites listed below are recommended resources for roadside vegetation management. They can provide examples of existing protocols and management strategies, as well as additional information on specific operational BPs (e.g., erosion and sediment control techniques).

**MoT Technical Circulars:**

MoT Technical Circulars are available at:
http://www.th.gov.bc.ca/Publications/Circulars/Current_technical.asp

**Locally Developed BPs**
**(Provide any locally-developed BPs):**

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**Other Resources:**

**Protection of the Environment – Section 165 – 2008 Standard Specifications for Highway Construction.** 2008. BC Ministry of Transportation and Infrastructure.
http://www.th.gov.bc.ca/Publications/const_maint/contract_serv/standard_specs/2009_Stand_Specs_Vol_1.pdf

**Revegetation Seeding – Section 757 – 2008 Standard Specifications for Highway Construction.** 2008. BC Ministry of Transportation and Infrastructure.
http://www.th.gov.bc.ca/Publications/const_maint/contract_serv/standard_specs/2009_Stand_Specs_Vol_2.pdf

**Manual of Control of Erosion and Shallow Slope Movement. August 1997.** BC Ministry of Transportation.
http://www.th.gov.bc.ca/Publications/eng_publications/environment/references/Man_Control_Erosion.pdf

**Standards and Best Practices For Instream Works. March 2004**. Ministry of Water, Land and Air Protection.
http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf

**Erosion and Sediment Control Guide for Roadway Projects.** 2005. Transportation Association of Canada.
http://www.transportationassociation.ca/english/informationservices/tacnews/summer2005-17.htm

**Erosion and Sediment Control Field Manual.** June 1999.
California Regional Water Quality Control Board.
http://www.saratoga.ca.us/pdf/ErosionFieldManual.pdf

**Aggregrate Operators Best Management Practices Handbook for British Columbia**
http://www.empr.gov.bc.ca/Mining/MineralStatistics/MineralSectors/ConstructionAggregates/ReportsandPublications/Pages/AggregateOperators.aspx

**Water Quality Best Management Practices Compendium Website.**
Environmental Protection Division, Ministry of Environment.
http://www.env.gov.bc.ca/wat/wq/nps/BMP_Compendium/nps_bmp.htm

**Catalogue of Stormwater Best Management Practices.** September 2005.
Idaho Department of Environmental Quality.
http://www.deq.state.id.us/water/data_reports/storm_water/catalog/index.cfm

## Checklist for Environmental Protection Requirements

- ☐ Is your proposed work considered a "routine" maintenance activity? If not, approvals or permits may be required. Contact your local municipal, provincial, or federal regulatory agency staff.
- ☐ Has this project been discussed with local environmental regulatory staff? In addition to the BP information presented, other site-specific conditions may apply.
- ☐ Have site-specific environmental protection requirements been identified? List below:
- ☐ ____________________
- ☐ ____________________
- ☐ ____________________
- ☐ ____________________

## 6.2 Invasive Plant Management

The management of invasive plants during road construction and highway maintenance activities presents a significant challenge for the Ministry of Transportation and Infrastructure, its Maintenance Contractors, and adjacent land managers. Many highway operational activities carry the risk of potentially introducing or spreading invasive plants. The term invasive plant includes provincially listed noxious weeds as well as other introduced plant species with the potential to pose undesirable impacts on humans, animals, or ecosystems.

### Environmental Issues

Primary environmental issues relating to the management of invasive plants and noxious weeds are summarized in the following table. It should be noted that site-specific conditions might present additional issues you will need to address in planning and undertaking your works.

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Shoulder Gravelling** *(See Section 5.2)* | May contribute to the spread of noxious weeds by modifying roadside growing conditions, displacing native plants, or transporting invasive plant material | No dispersal of noxious weeds or their seeds (*Weed Control Act*, Weed Control Regulation). |
| **Shoulder Maintenance** *(See Section 5.2)* | May contribute to the spread of noxious weeds by displacing or disturbing native vegetation, transporting plant material and seeds | No dispersal of noxious weeds or their seeds (*Weed Control Act*, Weed Control Regulation). |
| **Debris Removal** *(See Section 5.4)* | May contribute to the spread of noxious weeds if the removed material is improperly handled | No dispersal of noxious weeds or their seeds (*Weed Control Act*, Weed Control Regulation). |

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Ditch and Watercourse Maintenance** *(See Section 5.5)* | May contribute to the spread of noxious weeds by displacing native vegetation or through improper disposal of invasive plant material | No dispersal of noxious weeds or their seeds (*Weed Control Act*, Weed Control Regulation). |
| **Shore, Bank and Watercourse Maintenance** *(See Section 5.7)* | May contribute to the spread of noxious weeds by displacing native vegetation or through improper disposal of invasive plant material | No dispersal of noxious weeds or their seeds (*Weed Control Act*, Weed Control Regulation). |
| **Shore, Bank and Watercourse Maintenance** *(See Section 5.7)* | May displace native vegetation | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)). |
| | May contribute to the spread of noxious weeds if the removed material is improperly handled<br>May adversely affect animal and public health, e.g., skin burns from Hog Weed | No dispersal of noxious weeds or their seeds (*Weed Control Act*, Weed Control Regulation). |
| | May introduce deleterious substances to a watercourse when chemicals or biocontrol management methods are implemented | No use, handling, release, transport, storage, or disposal of a pesticide in a manner that causes or is likely to cause an unreasonable adverse effect (*Integrated Pest Management Act* and Regulations).<br>No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)).<br>No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)). |

## Environmental Best Practices

The following BPs are provided as guidelines to help you ensure your routine works are completed in compliance with the performance standards and environmental legislation. Please note that the general BPs provided apply for most work activities within this category; if BPs specific to the activity are available they are also noted below.

### Regulatory Agency Contact

- Meet with the appropriate regulatory agency contact, as listed in Section 8, to discuss site-specific environmental protection measures. Refer to Section 7 for information on the Memorandum of Understanding with MoE and the recommended protocol for maintaining regular communications with regulatory agencies.
- For invasive plant control work this will involve meeting with the local invasive plant coordinator and/or weed control contractors to review proposed vegetation control work.

- Ensure all chemical control of noxious weeds/invasive plants is done under a valid Pest Management Plan and/or Permit from MoE.
- Contractors should coordinate manual/mechanical controls with other agencies carrying out herbicide work on invasive plants.

### Timing of Works

- Be aware that vegetation clearing can negatively impact nesting birds in spring and early summer. Inspect your work area for any occupied bird nests, eggs, or nests of species protected under the *Wildlife Act* and *Migratory Bird Convention Act* during this period.
- When works require renegotiation activities, act quickly to establish a native plant cover that will aid in excluding invasive plants from disturbed sites.
- Plan control activities prior to flowering and seed-set stages of plant growth.

### Material Handling

- Use clean fill material free of invasive plant seeds.
- For re-vegetation activities, select locally adapted, non-invasive plant species.
- Prior to removing invasive plant species refer to methods outlined in the T.I.P.S. publications created by the Invasive Plant Council of British Columbia.
- If Adopt-a-Highway groups, or other crews, are used for invasive plant removal programs, ensure they receive proper training on requirements for actual plant removal and safety for operations
- Ensure that noxious weed/invasive plant removal or control methods that chemically or physically modify habitat are in accordance with the I*ntegrated Pest Management Act* & Regulations, Section 9 of the *Water Act,* and Section 35(1) of the *Fisheries Act.*
- Ensure all noxious weed/invasive plant materials are disposed of in accordance with the *Weed Control Act* Regulations and any local area protocols. When transporting noxious weeds/invasive plant or their seeds, use a covered container.

### Equipment Use

- Avoid parking or staging equipment in areas of invasive plant infestations.
- Wash or brush down vehicles or equipment used in the removal of noxious weed/invasive plants to ensure they are free of noxious weeds/invasive plants and seed-containing material as they leave the work area. As a basic rule, remove and bag invasive plant seeds and plant parts from equipment. Dispose of all waste at a landfill or other designated site.

- When mowing, start vegetation control activities in "weed-free" areas and end in infested areas to minimize the risk of transporting seeds or plant materials.

## Key Information Sources

The documents and websites listed below are recommended resources for invasive plant management. They can provide examples of existing protocols and management strategies, as well as additional information on specific operational BPs.

### MoT Technical Circulars:

There are no relevant Technical Circulars authored to-date for this activity.

All Technical Circulars are available at:
http://www.th.gov.bc.ca/Publications/Circulars/Current_technical.asp

### Locally Developed BPs (Provide any locally-developed BPs):

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### Other Resources:

**T.I.P.S.: Targeted Invasive Plant Solutions.** Invasive Plant Council of British Columbia. 2007.
http://www.invasiveplantcouncilbc.ca/resources/targeted-invasive-plant-solutions-tips

**Invasive Plant Strategy for British Columbia.** Undated. Invasive Plant Council of BC.
www.invasiveplantcouncilbc.ca/publications/invasive-plant-strategy.pdf

**Riparian Management Area Guidebook.** Forest Practices Code. Ministry of Forests. 1995.
http://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/riparian/Rip-toc.htm

***BC Weed Control Act:* Noxious Weeds in BC Website.** Pest Management, Ministry of Agriculture and Lands.
http://www.al.gov.bc.ca/cropprot/noxious.htm

**"Dangerous Travelers" Invasive Plant Control Video**
http://www.fs.fed.us/invasivespecies/prevention/dangeroustravelers.shtml

**Roadside Vegetation Management Website.** US Department of Transportation, Federal Highway Administration
http://www.fhwa.dot.gov/environment/vegmgt/

**Adopt-a-Highway Program.** BC Ministry of Transportation and Infrastructure
http://www.th.gov.bc.ca/adopt-a-hwy/adopt-a-hwy_home.htm

## Checklist for Environmental Protection Requirements

☐ Is your proposed work considered a "routine" maintenance activity? If not, approvals or permits may be required. Contact your local municipal, provincial, or federal regulatory agency staff.

☐ Has this project been discussed with local environmental regulatory staff? In addition to the BP information presented, other site-specific conditions may apply.

☐ Have site-specific environmental protection requirements been identified? List below:

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## 6.3 Use of Potentially Harmful Substances

Highway maintenance activities frequently require the use of materials or substances that may be considered harmful to both humans and the environment. Wood preservatives, pesticides, road salts, and dust palliatives are examples of compounds that carry exposure warnings requiring workers to use personal protective equipment and make efforts to minimize their personal exposure because of risks to human health. Such substances also have the potential to harm plants, animals, and other organisms and to degrade soil, air, or water quality in a variety of ways. Toxic effects to some organisms like fish and other aquatic life may occur with only small exposures. In other cases, the effect may be more chronic with harmful substances enduring for long periods in sediment and soil.

NOTICE
HERBICIDE
SPOT TREATMENT OF
INVASIVE PLANTS (WEEDS)

### Environmental Issues

Primary environmental issues relating to the use of potentially harmful substances are summarized in the following table. It should be noted that site-specific conditions might present additional issues you will need to address in planning and undertaking your works.

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Working with Harmful Substances – General** | May introduce deleterious substances to a stream or roadside watercourse through runoff | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)).<br>Disposal of all waste materials in accordance with the *Act* and reporting of any hazardous materials (*Environmental Management Act*) |
| | May damage roadside riparian vegetation or other significant habitats depending on method of application | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)). |

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Using Treated Wood Products** | If used below the high water mark of a watercourse it may release preservatives toxic to fish. | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)).<br>Reporting of any polluting substance spills (*Environmental Management Act*, Section 79(5)) and disposal of all waste materials in accordance with the *Act* (*Environmental Management Act*, Waste Disposal Regulation). |
| **Noxious Weed / Invasive Plant Control** *(See Section 5.10)* | May introduce deleterious substances to a watercourse when chemical management methods are implemented | No use, handling, release, transport, storage, or disposal of a pesticide in a manner that causes or is likely to cause an unreasonable adverse effect (*Integrated Pest Management Act* and Regulations).<br>No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)).<br>No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)). |
| **Application of Winter Aggregate and De-icing (Salt) Compounds** *(See Section 5.9)* | May introduce deleterious substances to a watercourse through application or improper materials containment<br>May damage vegetation, soil, surface or groundwater quality through potential salt leaching | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)).<br>Disposal of all waste materials in accordance with the *Act* and reporting of any hazardous materials (*Environmental Management Act*). |
| | May damage roadside riparian vegetation or other significant habitats through the over-spraying of de-icing compounds | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)). |
| **Dust Control** *(See Section 5.3)* | May introduce sediment or other deleterious substances through runoff or by direct application of dust control chemicals to watercourses at crossings | No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). |
| | May damage roadside riparian vegetation or other significant habitats through the over-spraying of road shoulders | No harmful alteration, disruption or destruction of fish habitat without authorization (*Fisheries Act*, Section 35(1)). |
| | May contaminate surface waters, groundwater, and soils through improper storage or disposal of dust control palliatives | Reporting of any polluting substance spills (*Environmental Management Act*, Section 79(5)) and disposal of all waste materials in accordance with the *Act* (*Environmental Management Act*, Waste Disposal Regulation).<br>No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act*, Sections 34(1) and 36(3)). |

| Work Activity | Potential Environmental Impacts | Performance Standards and Legal Requirements |
|---|---|---|
| **Rest Area Maintenance** *(See Section 5.11)* | May introduce chlorinating compounds (used to treat potable water), wood preservatives, cleaning products, etc., to soil or water | Reporting of any polluting substance spills (*Environmental Management Act,* Section 79(5)) and disposal of all waste materials in accordance with the *Act* (*Environmental Management Act,* Waste Disposal Regulation).<br>No release of any substance that could be deleterious (toxic) to fish or fish habitat (*Fisheries Act,* Sections 34(1) and 36(3)). |

## Environmental Best Practices

The following BPs are provided as guidelines to help you ensure your routine works are completed in compliance with the performance standards and environmental legislation. Please note that the general BPs provided apply for most work activities within this category; if BPs specific to the activity are available they are also noted below.

**Emergency Spills**

Keep a spill containment kit readily accessible on-site in the event of a release of a deleterious substance into the environment.

**Emergency Contacts**

MoE's Environmental Emergency Management Program can be contacted through the **BC Provincial Emergency Program (PEP) at 1-800-663-3456**

### Regulatory Agency Contact

- Prior to using potentially harmful substances as part of your management activities, identify any sensitive habitat areas, including wetted ditches and natural watercourses (streams, lakes and marine foreshores), found within your work area that may be of concern to regulatory agencies.
- Meet with the appropriate regulatory agency contact, as listed in Section8, to discuss site-specific environmental protection measures. Refer to Section 7 for information on the Memorandum of Understanding with MoE and the recommended protocol for maintaining regular communications with regulatory agencies.

### Material Selection

- Consider the use of alternatives substances in environmentally sensitive areas (i.e., near watercourses).

### Materials Storage

- Store hazardous materials in accordance with applicable regulations and ensure that deleterious substances are handled with care.
- Ensure that hazardous materials use, storage and disposal is in accordance with the information contained in their Material Safety Data Sheets.
- Store potentially harmful substances such as wood preservatives, pesticides, and road salts on impermeable surfaces to prevent their release to soils and groundwater.

- Minimize loss at storage piles. Keep storage piles of materials containing potentially harmful substances (road salt) well covered and dry to prevent chemical release through leaching and storm water runoff.
- Have a spill response plan in place and spill kits on site.

**Equipment Use**

- Ensure equipment is selected and operated to accurately apply potentially harmful substances.
- Mix any hazardous materials to be used in a contained area to reduce the risk of contaminating soils or surface waters adjacent to the road surface.
- Clean tools and equipment off-site to prevent the release of wash water that may contain potentially harmful substances.
- Use caution during loading of trucks and transport of substances to minimize loss of materials.

## Key Information Sources

The documents and websites listed below are recommended resources for winter road maintenance. They can provide examples of existing protocols and management strategies, as well as additional information on specific operational BPs.

**MoT Technical Circulars:**

**Use of Hog Fuel for Road Construction Purposes** T-17/06

**Dust Abatement Chemicals** T-5/94

These and all other MoT Technical Circulars are available at:
http://www.th.gov.bc.ca/Publications/Circulars/Current_technical.asp

**Locally Developed BPs**
**(Provide any locally-developed BPs):**

-
-
-

**Other Resources:**

**Recognized Products List.** Ministry of Transportation.
http://www.th.gov.bc.ca/publications/eng_publications/geotech/rpl.htm

**Best Management Practices to Mitigate Road Dust from Winter Traction.** Environmental Protection Division, Ministry of Environment. March 2005.
http://www.env.gov.bc.ca/air/airquality/pdfs/roaddustbmp_june05.pdf

**Water Quality Best Management Practices Compendium Website.** Environmental Protection Division, Ministry of Environment.
http://www.env.gov.bc.ca/wat/wq/nps/BMP_Compendium/nps_bmp.htm

**Roadsalt and Winter Maintenance for British Columbia Municipalities, Best Management Practices to Protect Water Quality.** Warrington, P.D. December 1998
http://www.env.gov.bc.ca/wat/wq/bmps/roadsalt.html

**Environmental Impacts of Road Salts.** Environment Canada Science and Environment Bulletin. January/February 2002.
http://www.ec.gc.ca/science/sandejan02/article3_e.html

**Dust Palliative Selection and Application Guide.** Nov. 1999. Bolander, Peter and Alan Yamada. San Dimas Technology and Development Centre.
http://www.ecy.wa.gov/programs/air/pdfs/Dust_Palliative.pdf

**Pesticide Wise Environmental Fate. BC Ministry of Agriculture and Lands.** 2007. http://www.al.gov.bc.ca/pesticides/c_2.htm

**Guidelines to Protect Fish and Fish Habitat From Treated Wood Used in Aquatic Environments in the Pacific Region.**
http://www.wwpinstitute.org/pdffiles/treatedwoodguidelines.pdf

### Checklist for Environmental Protection Requirements

- ☐ Is your proposed work considered a "routine" maintenance activity? If not, approvals or permits may be required. Contact your local municipal, provincial, or federal regulatory agency staff.
- ☐ Has this project been discussed with local environmental regulatory staff? In addition to the BP information presented, other site-specific conditions may apply.
- ☐ Have site-specific environmental protection requirements been identified? List below:
- ☐ ____________________
- ☐ ____________________
- ☐ ____________________
- ☐ ____________________

# 7 Interagency Communications

## 7.1 Memorandum of Understanding (MoU)

The Ministry of Transportation and Infrastructure has had a Memorandum of Understanding (MoU) with the Ministry of Environment concerning highway operational activities since 1996. This agreement was renewed and substantially revised in 2003 and is presently in the process of being renewed again. Essentially, this MoU is a commitment by both ministries to work together to ensure that highway operational activities are carried out in the most practical manner, while ensuring that environmental values are protected, and where possible, enhanced.

The goals of the current MoU are as follows:

**Facilitate communications to improve the understanding of operational works and environmental requirements**

- The ministries will improve dialogue by holding regular pre-construction and post-construction meetings at the working level, as well as periodic meetings at the Executive level to address policy and other matters affecting operations of both organizations

**Ensure the impacts of highway operational activities on the environment are minimized**

- The ministries will be open to exploring various options to achieve operational objectives in a timely manner, while ensuring environmental protection
- Encourage the timely resolution of issues to reduce the potential for formal legal action
- Where environmental stewardship issues are identified by MoE, resolution of those issues will follow a protocol to resolve matters at a local level before they are elevated to the Executive level.

The MoU is available for viewing or download from the MoT Environment Management Section website:

http://www.th.gov.bc.ca/mot_org/hwyeng/environmenthome.htm

## 7.2 Communications Protocol

The following sample agenda is provided as a guide to support the working level meetings outlined in Goal 1 of the MoU. Regular pre-construction and post-construction meetings are an essential part of communication between the MoT and MoE, enabling both Ministries to help streamline field operations, and promote environmentally responsible works. Key individuals, with the authority to act and implement as needed, should be in attendance at these meetings.

### Example

**Interagency Highway Operations Update Meeting**

**Agenda**

1. Introduction of Participants (including roles and responsibilities)
2. Regulatory Updates/New Areas of Regulatory Emphasis – MoE
3. Summary of Proposed/Completed Operational Works – MoT
4. Issues Arising Related to Proposed/Completed Operational Works (e.g., anticipated challenges, lessons learned) – All
5. Review of and Suggested Revisions to Local Environmental Best Practices – All
6. Partnering and Coordination Opportunities (e.g., coordination of invasive plant management, work "window" extensions) – All
7. Summary of Actions Arising from the Meeting – MoT
8. Meeting Wrap-Up/Scheduling of Next Meeting – MoT

# 8 Regulatory Agency and Other Contacts

To locate your local provincial regulatory agency staff (e.g., Habitat Officers, Conservations Officers), contact Enquiry BC (available between 7:30am and 5:00pm PST, Monday through Friday).

| | |
|---|---|
| In Victoria call: | **250 387-6121** |
| In Vancouver call: | **604 660-2421** |
| Elsewhere in BC call: | **1 800 663-7867** |
| Outside British Columbia: | **604 660-2421** |
| Email address | **EnquiryBC@gov.bc.ca** |

Regional Ministry of Environment and Front Counter BC, and federal Fisheries and Oceans Canada offices may be reached through the contact information presented below:

**BC Ministry of Environment**
**Regional Ecosystem Section Contacts**

| Office | Mailing Address | Phone/Fax/Email |
|---|---|---|
| **Region 1**<br>Vancouver Island | 2080 A Labieux Road,<br>Nanaimo BC V9T 6J9 | Phone: (250) 751-3100<br>Fax: (250) 7513103 |
| **Region 2**<br>Lower Mainland | 2nd Floor – 10470-152nd St.,<br>Surrey, BC V3R 0Y3 | Phone: (604) 582-5200<br>Fax: (604) 930-7119 |
| **Region 3/8**<br>Thompson/Okanagan | 1259 Dalhousie Drive,<br>Kamloops, BC V2C 5Z5<br>102 Industrial Place<br>Penticton, BC V2A 7C8 | Phone: (250) 371-6281<br>Fax: (250) 828-4000 |
| **Region 4**<br>Kootenay | #401 - 333 Victoria Street,<br>Nelson, BC V1L 4K3<br>205 Industrial Road<br>Cranbrook, BC V1C 7G5 | Phone: (250) 354-6333<br>Fax: (250) 354-6332 |
| **Region 5**<br>Cariboo | #400 - 640 Borland Street,<br>Williams Lake, BC V2G 4T1 | Phone: (250) 398-4530<br>Fax: (250) 398-4214 |
| **Region 6**<br>Skeena | PO Box #5000 - 3726 Alfred Avenue,<br>Smithers, BC V0J 2N0 | Phone: (250) 847-7260<br>Fax: (250) 847-7591 |
| **Region 7**<br>Omineca | 4051-18th Ave.<br>Prince George, BC V2N 1B3 | Phone: (250 565-6135<br>Fax: (250) 565-6940 |
| **Region 9**<br>Peace | 10003-110th Ave. Rm. 400,<br>Fort St. John, BC V1J 6M7 | Phone: (250) 787-3411<br>Fax: (250) 787-3490 |

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**Ministry of Environment Regions Map**

| BC Conservation Officer Service | |
|---|---|
| **South Coast Region** | |
| **Nanaimo Office (Regional Headquarters):**<br>Phone: (250) 751-3190 | **Campbell River Office:**<br>Phone: (250) 286-7630 |
| **Chilliwack Office:**<br>Phone: (604) 795-8422 / 1-800-731-6373 | **Duncan Office:**<br>Phone: (250) 746-1236 |
| **Port Alberni Office:**<br>Phone: (250) 724-9290 | **Port Hardy Office:**<br>Phone: (250) 949-2800 |
| **Powell River Office:**<br>Phone: (604) 485-3612 / 1-800-731-6373 | **Sechelt Office:**<br>Phone: (604) 740-5858 / 1-800-731-6373 |
| **Squamish Office:**<br>Phone: (604) 898-2175 / 1-800-731-6373 | **Surrey Office:**<br>Phone: (604) 582-5250 / 1-800-731-6373 |
| **Victoria Office:**<br>Phone: (250) 391-2225 | |
| **Interior Region** | |
| **Kamloops Office (Regional Headquarters):**<br>Phone: (250) 371-6281 | **100 Mile Office:**<br>Phone: (250) 395-5511 |
| **Bella Coola Office:**<br>Phone: (250) 982-2421 / (250) 398-4569 | **Castlegar Office:**<br>Phone: (250) 365-8611 |
| **Cranbrook Office:**<br>Phone: (250) 489-8540 | **Creston Office:**<br>Phone: (250) 428-3220 |
| **Fernie Office:**<br>Phone: (250) 423-7551 | **Grand Forks Office:**<br>Phone: (250) 442-4350 |
| **Invermere Office:**<br>Phone: (250) 342-4266 | **Kelowna Office:**<br>Phone: (250) 861-7670 / 1-877-356-2029 |
| **Lillooet Office:**<br>Phone: (250) 265-4636 | **Merritt Office:**<br>Phone: (250) 378-8489 |
| **Nelson Office:**<br>Phone: (250) 354-6397 | **Penticton Office:**<br>Phone: (250) 490-8203 / 1-877-356-2029 |

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| **Region 6**<br>Skeena | PO Box #5000 - 3726 Alfred Avenue.<br>Smithers. BC V0J 2N0 | Phone: (250) 847-7260<br>Fax: (250) 847-7591 |
| **Region 7**<br>Omineca | 4051-18th Ave.<br>Prince George. BC V2N 1B3 | Phone: (250 565-6135<br>Fax: (250) 565-6940 |
| **Region 9**<br>Peace | 10003-110th Ave. Rm. 400,<br>Fort St. John, BC V1J 6M7 | Phone: (250) 787-3411<br>Fax: (250) 787-3490 |

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Ministry of Environment Regions Map

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| **Chilliwack Office:**<br>Phone: (604) 795-8422 / 1-800-731-6373 | **Duncan Office:**<br>Phone: (250) 746-1236 |
| **Port Alberni Office:**<br>Phone: (250) 724-9290 | **Port Hardy Office:**<br>Phone: (250) 949-2800 |
| **Powell River Office:**<br>Phone: (604) 485-3612 / 1-800-731-6373 | **Sechelt Office:**<br>Phone: (604) 740-5858 / 1-800-731-6373 |
| **Squamish Office:**<br>Phone: (604) 898-2175 / 1-800-731-6373 | **Surrey Office:**<br>Phone: (604) 582-5250 / 1-800-731-6373 |
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| **Cranbrook Office:**<br>Phone: (250) 489-8540 | **Creston Office:**<br>Phone: (250) 428-3220 |
| **Fernie Office:**<br>Phone: (250) 423-7551 | **Grand Forks Office:**<br>Phone: (250) 442-4350 |
| **Invermere Office:**<br>Phone: (250) 342-4266 | **Kelowna Office:**<br>Phone: (250) 861-7670 / 1-877-356-2029 |
| **Lillooet Office:**<br>Phone: (250) 265-4636 | **Merritt Office:**<br>Phone: (250) 378-8489 |
| **Nelson Office:**<br>Phone: (250) 354-6397 | **Penticton Office:**<br>Phone: (250) 490-8203 / 1-877-356-2029 |

| BC Conservation Officer Service | |
|---|---|
| **Interior Region (cont'd)** | |
| **Princeton Office:**<br>Phone: (250) 295-6343 / 1-877-356-2029 | **Quesnel Office:**<br>Phone: (250) 992-4212 |
| **Revelstoke Office:**<br>Phone: (250) 837-9683 | **Vernon Office:**<br>Phone: (250) 558-1776 / 1-877-356-2029 |
| **Williams Lake Office:**<br>Phone: (250) 398-4569 | **Clearwater Office;**<br>(250) 674-3722 |
| **Northern Region** | |
| **Prince George Office (Regional Headquarters):**<br>Phone: (250) 565-6140 | **Atlin Office:**<br>Phone: (250) 651-7501 |
| **Burn's Lake Office:**<br>Phone: (250) 692-7777 | **Chetwynd Office:**<br>Phone: (250) 788-3611 |
| **Dawson Creek Office:**<br>Phone: (250) 784-2304 | **Dease Lake Office:**<br>Phone: (250) 847-7266 / (250) 771-3566 |
| **Fort Nelson Office:**<br>Phone: (250) 774-3547 / (250) 787-3225 | **Ft. St. John Office:**<br>Phone: (250) 787-3225 |
| **Mackenzie Office:**<br>Phone: (250) 997-6555 | **Queen Charlotte City Office:**<br>Phone: (250) 559-8431 |
| **Smithers Office**<br>Phone: (250) 847-7266 | **Terrace Office:**<br>Phone: (250) 638-6530 |
| **Vanderhoof Office:**<br>Phone: (250) 567-6304 | |

## Front Counter BC
## Natural Resources Service Centres

| Office | Mailing Address | Phone/Fax/Email |
|---|---|---|
| **Anywhere in North America** | Toll Free | 1-877-855-3222 |
| **Lower Mainland Service Region**<br>Service Centre – Surrey | Suite 200-10428 153rd St<br>Surrey BC V3R 1E1 | Tel: (604) 586-4400<br>Fax: (604) 586-4434 |
| **Omineca Service Region**<br>Service Centre - Prince George | 200-1488 4th Avenue<br>Prince George, BC V2L 4Y2 | Tel: (250) 565-6779<br>Fax: (250) 565-6941 |
| **Southern Interior Service Region**<br>Service Centre - Kamloops | #210 - 301 Victoria St.<br>Kamloops, BC V2C 2A3 | Tel: (250) 372-2127<br>Fax: (250) 377-2150 |
| **Vancouver Island Service Region**<br>Service Centre – Nanaimo | Suite 142, 2080 Labieux Rd.<br>Nanaimo, BC V9T 6J9 | Tel: (250) 751-7220<br>Fax: (250) 751-7224 |
| **Vancouver Island Service Region**<br>Service Centre – Victoria | Sussex Place<br>Suite G7, 1001 Douglas St.<br>Victoria, BC V8W 2C5 | Tel: (250) 387-3791<br>Fax: (250) 387-3752 |
| **Cariboo Service Region**<br>Service Centre – Williams Lake | #201 - 172 North 2nd Ave<br>Williams Lake, BC V2G 1Z6 | Tel: (250) 398-4574<br>Fax: (250) 398-4836 |
| **Kootenays Service Region**<br>Service Centre – Cranbrook | 1902 Theatre Road<br>Cranbrook, BC V1C 7G1 | Tel: (250) 426-1766<br>Fax: (250) 426-1767 |
| **Peace River Service Region**<br>Service Centre – Fort St. John | 100-10003 110 Avenue<br>Fort St John BC V1J 6M7 | Tel: (250) 787-3415<br>Fax: (250) 261-2084 |
| **Skeena Service Region**<br>Service Centre – Smithers | 1st Floor, 3726 Alfred Ave.<br>Smithers, BC V0J 2N0 | Tel: (250) 847-7356<br>Fax: (250) 847-7556 |

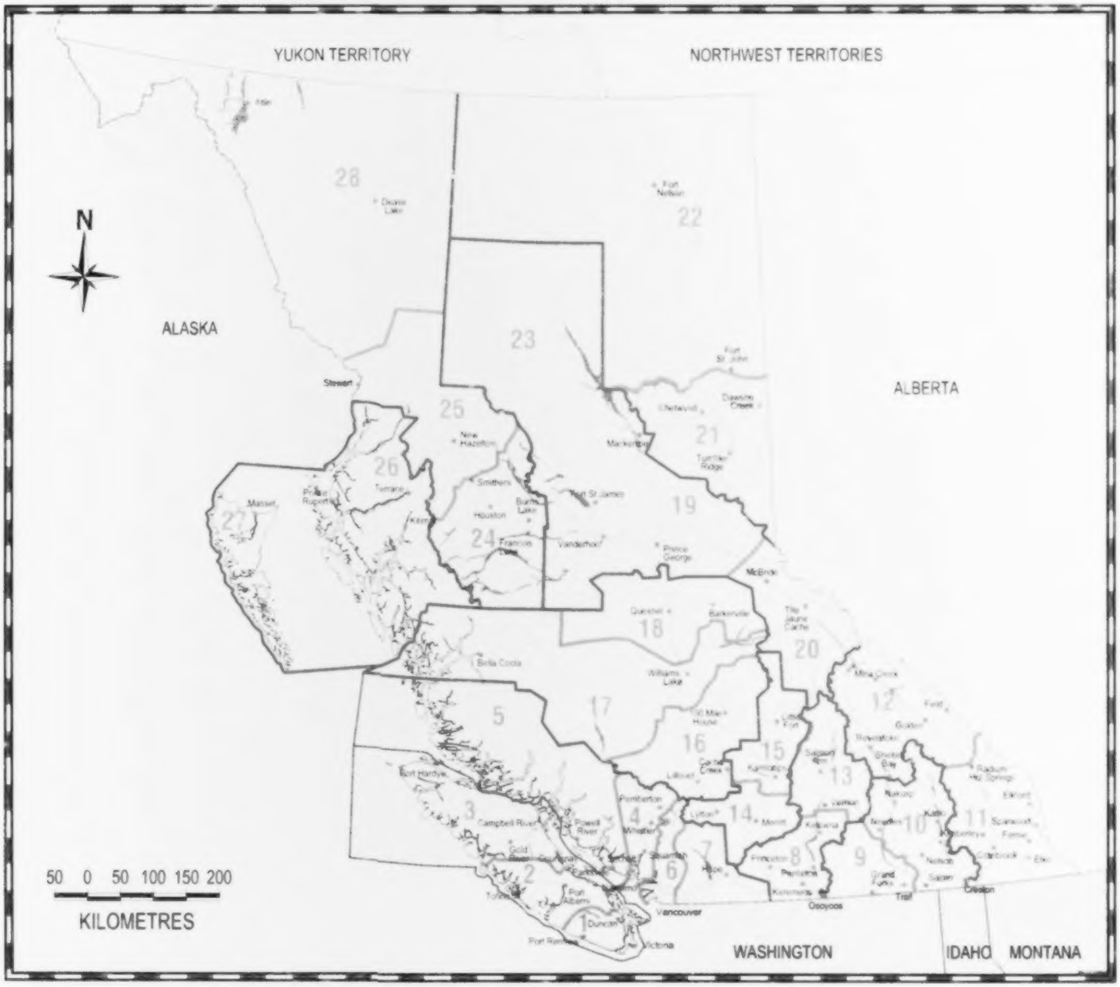
| Fisheries and Oceans Canada (DFO) BC Offices | | | |
|---|---|---|---|
| **Office** | **Address** | **Contact Information** | **Hours of Operation** |
| **Bella Bella** | Box 38,<br>Bella Bella, BC V0T 1B0 | Tel: (250) 957-2363<br>Fax: (250) 957-2767 | Call Ahead:<br>No Admin. Staff |
| **Bella Coola** | Box 130 (Hwy 20)<br>Bella Coola, BC V0T 1C0 | Tel: (250) 799-5345<br>Fax: (250) 799-5540 | M to F: 8 AM to 4 PM |
| **Campbell River** | 315 – 940 Alder Street,<br>Campbell River, BC V9W 2P8 | Tel: (250) 850-5701<br>Fax: (250) 286-5852 | M to F: 8 AM to 4 PM |
| **Chilliwack** | 327 – 44500 South Sumas Road<br>Chilliwack, BC V2R 5M3 | Tel: (604) 824-3300<br>Fax: (604) 858-0002 | M to F: 10 AM to 2 PM |
| **Clearwater** | Box 610 – 1121 E. Yellowhead Hwy.<br>Clearwater, BC V0E 1N0 | Tel: (250) 674-2633<br>Fax: (250) 674-3553 | Call Ahead: |
| **Comox** | 148 Port Augusta Street,<br>Comox, BC V9M 3N6 | Tel: (250) 339-2031<br>Fax: (250) 339-4612 | M to F: 9 AM to 3:30 PM |
| **Delta** | 100 Annacis Parkway, Unit 3<br>Delta, B.C. V3M 6A2 | Tel: (604) 666-8266<br>Fax: (604) 666-7112 | M to F: 8 AM to 4 PM |
| **Duncan** | Box 241, 5653 Club Road,<br>Duncan, BC V9L 3X3 | Tel: (250) 746-6221<br>Fax:(250) 746-8397 | M to F: 10 AM to 12 PM |
| **Gold River** | 499 Muchalaht Drive (Box 130)<br>Gold River BC, V0P 1G0 | Tel: (250) 283-9075<br>Fax: (250) 283-9058 | Call Ahead:<br>No Admin Staff |
| **Hazelton** | Box 490 4351 – 11th Avenue,<br>New Hazelton, BC V0J 2J0 | Tel: (250) 842-6327<br>Fax:(250) 842-6283 | Call Ahead:<br>No Admin. Staff |
| **Kamloops** | 985 McGill Place,<br>Kamloops, BC V2C 6X6 | Tel: (250) 851-4950<br>Fax: (250) 851-4951 | M to F: 8 AM to 4 PM |
| **Langley** | 5550 – 268th Street,<br>Langley, BC V4W 3X4 | Tel: (604) 607-4150 | M to F: 8 AM to 4 PM |
| **Lillooet** | Box 315 – 654 Industrial Place,<br>Lillooet, BC V0K 1V0 | Tel: (250) 256-2650<br>Fax: (250) 256-2660 | M to F: 8 AM to 4 PM |
| **Masset** | Box 99, 1590 Old Beach Road,<br>Masset, BC V0T 1M0 | Not Currently Staffed Contact Queen Charlotte City for assistance | M to F: 8 AM to 4 PM |
| **Mission** | 32873 London Avenue,<br>Mission, BC V2V 6M7 | Tel: (604)814-1055<br>Fax: (604) 814-1064 | M to F: 8 AM to 4 PM |
| **Nanaimo (Front Street)** | 60 Front Street,<br>Nanaimo, BC V9R 5H7 | Tel: (250) 754-0230<br>Fax: (250) 754-0309 | M to F: 8 AM to 4 PM |
| **Nanaimo (SCD)** | 3225 Stephenson Point Road,<br>Nanaimo, BC V9T 1K3 | Tel: (250) 756-7270<br>Fax:(250) 756-7162 | M to F: 8 AM to 4 PM |

## Fisheries and Oceans Canada (DFO) BC Offices

| Office | Address | Contact Information | Hours of Operation |
|---|---|---|---|
| **Nelson** | 118 McDonald Drive,<br>Nelson, BC V1L 6B9 | Tel. (250) 352-0891<br>or (250) 352-0892<br>Fax. (250) 352-0916 | M to F: 8:30 AM to 4:30 PM |
| **Parksville** | 457 East Stanford Avenue,<br>Parksville, BC V9P 1V7 | Tel: (250) 954-2675<br>Fax:(260) 248-6776 | Call Ahead:<br>No Admin. Staff |
| **Pender Harbour** | Box 10 12841 Madeira Park Rd,<br>Madeira Park, BC V0N 2H0 | Tel: (604) 883-2313<br>Fax: (604) 883-2152 | M to F: 8 AM to 12 PM |
| **Port Alberni** | 250 – 4877 Argyle Street<br>Port Alberni, BC V9Y 1V9 | Tel: (250) 720-4440<br>Fax:(250) 724-2555 | M to F: 8 AM to 4 PM |
| **Port Hardy** | Box 10, 8585 Wolloson Road,<br>Port Hardy, BC V0N 2P0 | Tel: (250) 949-6422<br>Fax:(250) 949-6755 | M to F: 8 AM to 4 PM |
| **Powell River** | 7255 Duncan Street,<br>Powell River, BC V8A 5N6 | Tel: (604) 485-7963<br>Fax:(604) 485-7439 | M to F: 8:30 AM to 12:30 PM |
| **Prince George** | 3690 Massey Drive,<br>Prince George, BC V2N 2S8 | Tel: (250) 561-5366<br>Fax:(250) 561-5534 | M to F: 8 AM to 4 PM |
| **Prince Rupert** | 417 2nd Avenue West,<br>Prince Rupert, BC V8J 1G8 | Tel: (250) 627-3499<br>Fax:(250) 627-3427 | M to F: 8 AM to 4 PM |
| **Queen Charlotte City** | PO Box 99, 137 Bay Street,<br>QCC, BC V0T 1S0 | Tel: (250) 559-4413<br>Fax:(250) 559-4678 | M to F: 8 AM to 4 PM<br>(Closed for lunch) |
| **Quesnel** | 97 – 1205 North Cariboo Hwy<br>Quesnel, BC V2J 2Y3 | Tel: (250) 992-2434<br>Fax:(250) 992-7232 | M to F: 8 AM to 1 PM |
| **Salmon Arm** | Box 1160, 1751 – 10th Ave SW,<br>Salmon Arm, BC V1E 4P3 | Tel: (250) 804-7000<br>Fax:(250) 804-7010 | M to F: 8 AM to 4 PM |
| **Smithers** | Box 578, 3177 Tatlow Road,<br>Smithers, BC V0J 2N0 | Tel: (250) 847-2312<br>Fax:(250) 847-4723 | M to F: 8 AM to 4 PM |
| **Squamish** | 1120 Hunter Place, Box 2360,<br>Squamish, BC V0N 3G0 | Tel: 604-892-3230<br>Fax:604-892-2378 | M to F: 8 AM to 4 PM |
| **Steveston** | 12551 No. 1 Road,<br>Richmond, BC V7E 1T7 | Tel: 604-664-9250<br>Fax:604-664-9255 | M to F: 8 AM to 4 PM |
| **Terrace** | 5235 A Keith Avenue,<br>Terrace, BC V8G 1L2 | Tel: (250) 615-5350<br>Fax:(250) 615-5364 | M to F: 8 AM to 4 PM |
| **Tofino** | Box 48, 161 1st Street 2nd Fl,<br>Tofino, BC V0R 2Z0 | Tel: (250) 725-3500<br>Fax:(250) 725-3944 | M to F: 8 AM to 12 PM |
| **Upper Nass** | 111 Nass Road, New Aiyansh<br>P.O. Box 216<br>New Aiyansh, BC V0J 1A0 | Tel: (250) 633-2408<br>Fax:(250) 633-2439 | Call Ahead:<br>No Admin. Staff |

| Fisheries and Oceans Canada (DFO) BC Offices | | | |
|---|---|---|---|
| **Office** | **Address** | **Contact Information** | **Hours of Operation** |
| Vancouver RHQ | Suite 200 - 401 Burrard Street,<br>Vancouver, BC V6C 3S4 | Tel: 604-666-0384<br>Fax: 604-666-1847 | M to F: 8 AM to 4 PM |
| Victoria | 4250 Commerce Circle,<br>Victoria, BC V8Z 4M2 | Tel: (250) 363-3252<br>Fax:(250) 363-0191 | M to F: 8 AM to 4 PM |
| Victoria - CCG | 25 Huron Street,<br>Victoria BC V8V 4V9 | Tel: (250) 480-2600<br>Fax: (250) 480-2702 | M to F: 8 AM to 4 PM |
| Whitehorse | 100 - 419 Range Road,<br>Whitehorse, Yukon Y1A 3V1 | Tel: (867) 393-6722<br>Fax:(867) 393-6738 | M to F: 8:00 AM to 4:30 PM |
| Williams Lake | 310A North Broadway,<br>Williams Lake, BC V2G 2Y7 | Tel: (250) 305-4002<br>Fax:(250) 305-3017 | M to F: 8 AM to 4 PM:<br>No admin staff after 12. |

**BC MoT Maintenance and Service Area Boundary Map**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Tumbler Ridge
Mackenzie
New Hazelton
Terrace
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Prince Rupert
Kitimat
Smithers
Houston
Burns Lake
Fort St. James
Fraser Lake
Vanderhoof
Prince George
McBride
Quesnel
Barkerville
Tête Jaune Cache
Bella Coola
Williams Lake
100 Mile House
Little Fort
Cache Creek
Lillooet
Kamloops
Salmon Arm
Mica Creek
Field
Golden
Revelstoke
Radium Hot Springs
Port Hardy
Campbell River
Powell River
Pemberton
Whistler
Squamish
Lytton
Merritt
Vernon
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Nakusp
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Tofino
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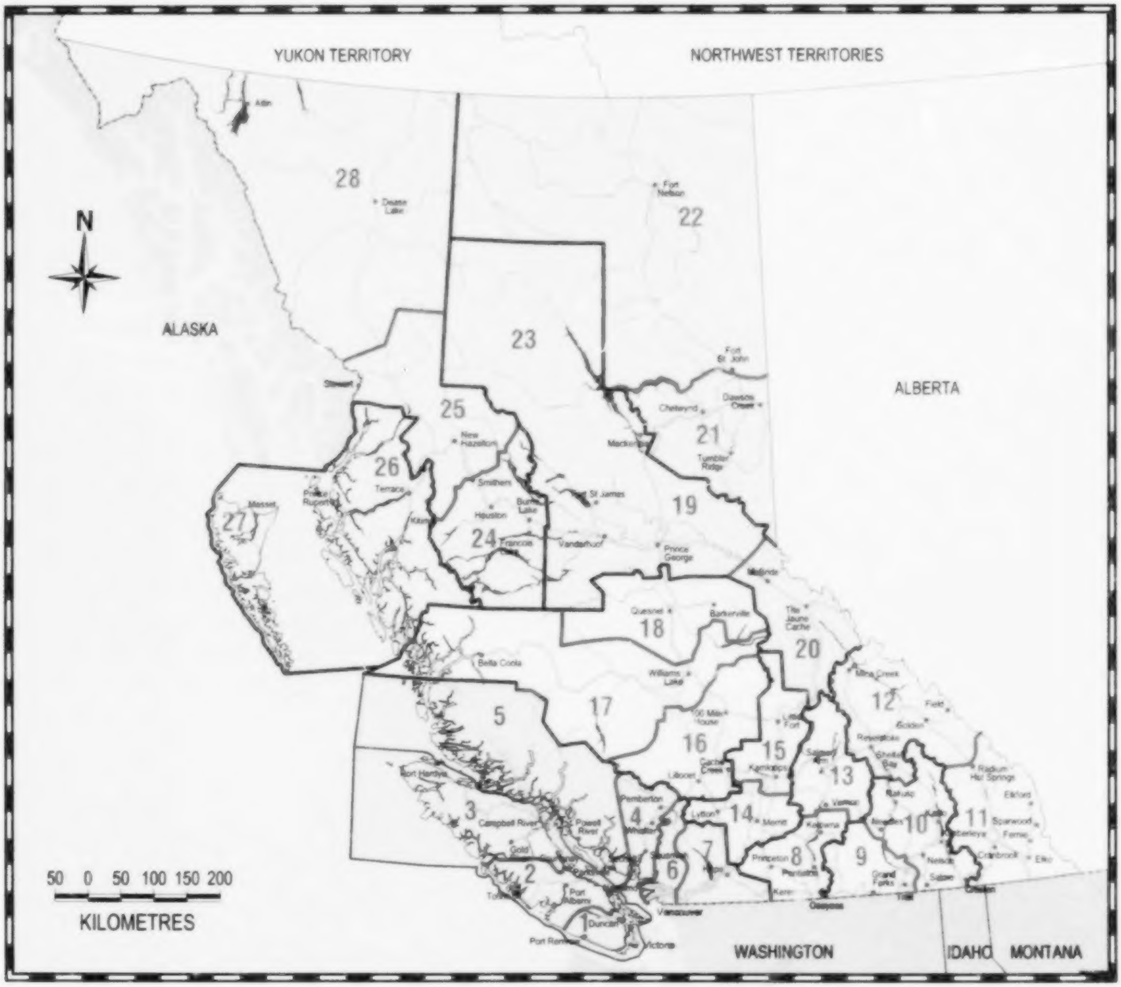
## BC MoT Maintenance and Service Area Boundary Map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Stewart
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Dawson Creek
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Mackenzie
Tumbler Ridge
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New Hazelton
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Terrace
Prince Rupert
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Masset
Kitimat
Smithers
Houston
Burns Lake
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Fort St James
Vanderhoof
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Prince George
McBride
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Quesnel
Barkerville
Tête Jaune Cache
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Bella Coola
Williams Lake
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100 Mile House
16
Little Fort
15
Kamloops
Cache Creek
Lillooet
Salmon Arm
13
12
Mica Creek
Field
Golden
Revelstoke
Radium Hot Springs
Elkford
11
Sparwood
Fernie
Cranbrook
Elko
10
Nakusp
Nelson
Salmo
Creston
9
Grand Forks
Trail
Osoyoos
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Princeton
Penticton
Keremeos
Kelowna
Vernon
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Merritt
Lytton
Pemberton
Whistler
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Hope
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Squamish
Vancouver
Victoria
Duncan
1
Port Renfrew
2
Port Alberni
Tofino
Gold River
3
Campbell River
Powell River
Port Hardy

### South Coast Region Maintenance Contractors

**Area 1 – South Vancouver Island (Victoria)**
Mainroad South Island Contracting Ltd.
1-877-391-7310

**Area 2 – Central Vancouver Island (Nanaimo – Port Alberni)**
Emcon Services Inc.
1-866-353-3136

**Area 3 – North Vancouver Island (Courtenay)**
Emcon Services Inc.
1-866-353-3136

**Area 4 – Howe Sound (West Vancouver)**
Mainroad Howe Sound Contracting Ltd.
1-866-904-0209

**Area 5 – Sunshine Coast (Gibsons)**
Capilano Highway Services Co.
1-800-665-3135

**Area 6 – Lower Mainland (Surrey)**
Mainroad Contracting Ltd.
(604) 271-0337

**Area 7 – Fraser Valley (Chilliwack)**
Emil Anderson Maintenance Company
1-800-667-5122

### Southern Interior Region Maintenance Contractors

**Area 8 – South Okanagan (Penticton – Kelowna)**
Argo Road Maintenance (South Okanagan) Inc
1-800-663-7623

**Area 9 – Kootenay Boundary (Grand Forks – Rossland)**
Emcon Services Inc.
1-866-353-3136

**Area 10 – Central Kootenay (Nelson – Creston)**
Yellowhead Road & Bridge (Kootenay) Ltd.
1-888-352-0356

**Area 11 – East Kootenay(Cranbrook – Fernie)**
Mainroad East Kootenay Contracting Ltd.
1-800-665-4929

**Area 12 – Selkirk (Revelstoke – Golden)**
HMC Services Inc.
1-866-353-3136

**Area 13 – Okanagan-Shuswap (Salmon Arm – Vernon)**
Argo Road Maintenance North Okanagan Inc.
1-877-546-3799

**Area 14 – Nicola (Merritt)**
VSA Highway Maintenance Ltd.
1-888-315-0025

**Area 15 – Thompson (Kamloops)**
Argo Road Maintenance (Thompson) Inc.
1-800-661-2025

**Area 16 – South Cariboo (100 Mile House)**
Interior Roads Ltd.
1-800-842-4122

**Area 17 – Central Cariboo (Williams Lake)**
Interior Roads Ltd
1-800-842-4122

**Area 18 – North Cariboo (Quesnel)**
HMC Services Inc.
1-866-353-3136

### Northern Region Maintenance Contractors

**Area 19 – Fort George (Prince George)**
Yellowhead Road and Bridge (Fort George) Ltd.
1-800-218-8805

**Area 20 – Robson (McBride)**
Lakes District Maintenance Ltd.
1-888-255-8055

**Area 21 – South Peace (Dawson Creek – Pouce Coupe)**
Caribou Road Services (South) Ltd.
1-800-667-2322

**Area 22 – North Peace ( Fort St. John)**
Yellowhead Road and Bridge (North Peace) Ltd.
1-888-883-6688

**Area 23 – Nechako (Vanderhoof)**
Yellowhead Road and Bridge (Vanderhoof) Ltd.
1-800-667-6636

**Area 24 – Lakes (Burns Lake)**
Lakes District Maintenance Ltd.
1-888-255-8055

**Area 25 – Bulkley Nass (Smithers)**
Nechako Northcoast Construction
(Billabong Road & Bridge Maintenance Inc.)
(250) 847-8737 then press 0, or 1-877-878-8664

**Area 26 – Skeena (Terrace)**
Nechako Northcoast Construction (141187 Ventures Ltd)
(250) 638-1881 then press 1, or 1-800-665-5051

**Area 27 – North Coast (Prince Rupert & Queen Charlotte Islands)**
O'Brien Road and Bridge Maintenance Ltd.
1-800-561-5822

**Area 28 – Stikine (Dease Lake)**
Lakes District Maintenance Ltd.
1-888-255-8055

# 9 Glossary

**Aquatic habitat:** Areas associated with water that provide food and cover and other elements critical to the completion of an organism's life cycle (e.g., bogs, swamps, riparian areas and streams).

**Avoidance:** Minimizing the effects of an undertaking on fish habitat through the identification and bypassing of areas of concern to fisheries.

**Bedload:** Particulates that are transported along the channel bottom in the lower layers of stream flow by rolling and bouncing.

**Best Practices (BPs):** A practice or combination of practices that are determined to be the most technologically and economically feasible means of preventing or managing potential impacts.

**Berm:** A ridge or small dyke that breaks the continuity of a slope.

**Buffer:** An area left undisturbed between a leave area and work site.

**Bioengineering:** The use of living plant materials to perform some engineering function (e.g., enhanced soil stability).

**Check dam:** A small dam constructed in a ditch or similar place to decrease water velocity and promote the accumulation of sediment.

**Cofferdam:** A watertight enclosure built in a shallow river or creek that is pumped dry to allow construction activities in the isolation of flowing water.

**Compensation:** "The placement of natural habitat, increase in the productivity of existing habitat or maintenance of fish production by artificial means in circumstances dictated by social and economic conditions, where mitigation techniques and other measures are not adequate to maintain habitats for Canada's fisheries resources" (DFO, 1986).

**Contaminated site:** An area of land in which the soil, surface water or groundwater contains harmful substances in quantities or concentrations that exceed specified criteria, standards, or conditions.

**Critical habitat:** Habitat that is necessary for the survival or recovery of a listed species and which may be identified as critical in the species' recovery strategy. Critical habitat may be legally identified by the federal government (*Species at Risk Act,* 2[1]).

**Deleterious substance:** Any substance harmful to fish or fish habitat.

**DFO:** Department of Fisheries and Oceans, also Fisheries and Oceans Canada.

**Diversion dam:** A barrier built within the active channel of a watercourse in order to divert water along a different flow path.

**Diversion ditch:** A ditch that directs water and silt into stabilized areas away from a watercourse.

**Due diligence:** A legal term that requires individuals on the job to maintain a reasonable standard of care. This term applies to environmental precautions but also to other areas such as safety, for example.

**Dyke:** An impervious elongated mound of earth constructed to confine water or another liquid from entering or leaving an area of land.

**Erosion:** The wearing away of soil and rock by water and wind action.

**Environmentally Sensitive Areas (ESAs):** Areas requiring special management attention to protect important scenic values, fish and wildlife resources, historical and cultural values, and other natural systems or processes.

**Fish:** The term "fish" includes "shellfish, crustaceans, marine animals, and the eggs, spawn, sperm, spat and juvenile stages of fish, shellfish, crustaceans and marine animals" (*Fisheries Act*).

**Fish habitat:** The *Fisheries Act* defines fish habitat as "spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes". Fish habitat comprises physical, chemical and biological attributes of the freshwater, estuarine, marine and terrestrial (riparian) environment that directly or indirectly support fish populations.

**Fisheries Sensitive Zone (FSZ):** An area that comprises the watercourse as well as associated riparian areas. Includes in-stream aquatic habitats, as well as the out-of-stream habitat features such as side channels and wetlands.

**Fisheries window:** Also referred to as the reduced risk window, timing window, or instream window. A time of reduced risk for important commercial, sport and resident fish species when instream construction is permitted.

**Fragmentation:** A process whereby large, connected ecological units (e.g., woodland) are transformed into one or more smaller patches surrounded by disturbed areas. This often results in the loss of continuous linkages used by wildlife for movement, food and shelter.

**Grade:** The slope of road, channel, or natural ground.

**Geotextile fabric:** A synthetic material placed under erosion control material (i.e., riprap), with the primary functions of layer separation, aggregate confinement and distribution of load.

**Harmful Alteration, Disruption or Destruction of fish habitat (HADD):** The DFO defines HADD of fish habitat as "any change in fish habitat that reduces its capacity to support one or more life processes of fish".

**Habitat:** The place where an organism lives and the conditions of that environment including the soil, vegetation, water and food.

**Habitat enhancement:** Any manipulation of habitat that improves its value and ability to meet the specified requirements of one or more species.

**Impervious surface:** Surfaces that prevent water from returning back into the ground, such as paved highways, roads, parking lots, roofs and compact soils.

**Invasive species:** Plants and animals that colonize and take over the habitats of native species. Most invasive species are also alien (non-native) to the area and can become dominant since natural population controls (e.g., predators, disease) in their native environment do not occur in their new location.

**Leave area:** The area of land and vegetation adjacent to an aquatic area that is to remain in an undisturbed state, throughout and after works.

**LWBC:** Land and Water British Columbia

**Migration:** Fish movements between two or more separate habitats (e.g., from over-wintering habitat to spawning habitat).

**Mitigation:** Actions taken during the planning, design, construction, and operation of a project to control, reduce or eliminate a potential adverse impact of a project.

**MoE:** BC Ministry of Environment, the Ministry formerly known as the Ministry of Water, Land and Air Protection (WLAP).

**MoT:** BC Ministry of Transportation and Infrastructure

**MoU:** Memorandum of Understanding between the Ministry of Transportation and Infrastructure and the Ministry of Environment

**No Net Loss:** A working principle of the Federal DFO which strives to balance unavoidable habitat losses through avoidance, mitigation, and habitat replacement on a project-by-project basis. (DFO, 1986).

**Nursery habitat:** Habitat where juvenile fish feed or take refuge (e.g., backwater areas, shallow creek margins).

**Results-based performance standards:** Typically define a maximum permissible disposal or impact threshold. For example, the concentration of a particular chemical in waste water discharge or a receiving environment; minimum in-stream flow levels; forest age class distribution within a defined zone. Requiring users of the environment to stay within the established threshold is presumed to achieve the environmental goal that the standard relates to. Results-based performance standards must be scientifically supported, as locally-relevant as possible, accepted by the public and stakeholders, enforceable by being capable of being measured, and affordable and feasible to implement (Brown, 2002)

**Revegetation:** The re-establishment of vegetation in disturbed areas.

**Riparian vegetation:** Vegetation adjacent to a watercourse, lake, swamp, or spring, that is generally critical for wildlife cover, fish food organisms, stream nutrients and large organic debris, and for stream bank stability.

**Riprap:** Rock or stone placed on earth surfaces for protection of the soil against the erosive action of flowing water or precipitation.

**Risk:** the probability that an undesirable event will or will not occur. It is the product of the probability of the event taking place, the probability of being exposed to the event, and the probability of certain outcomes occurring if exposure did take place. Risk can be statistically quantified in a risk assessment. (Dunster and Dunster 1996).

**Salmonid:** A general term that collectively refers to salmon species, trout and char.

**Sediment:** Particulate matter that is entrained within, or settled out from, water.

**Silt:** The fine-particulate fraction of sediment.

**Silt fence:** A synthetic barrier erected to restrict the movement of unconsolidated material from a disturbed area to any sensitive areas.

**Standard:** quantifiable and measurable thresholds that are typically defined in law or regulation, and are mandatory. A statement that outlines how well something should be done, rather than how it should be done. A standard does not necessarily imply fairness or equity, nor an absolute knowledge of cause-and-effect linkages. Standards are typically established using a combination of best available scientific knowledge, tempered by cautious use of an established safety (caution) factor. (Dunster and Dunster 1996).

**Stewardship:** caring for the land and associated resources so that healthy ecosystems can be passed on to future generations. (Dunster and Dunster 1996).

**Stream:** A watercourse, having an alluvial sediment bed, formed when water flows on a perennial or intermittent basis between continuous definable banks.

**Substrate:** The bottom or bed materials of a water body or watercourse in which plants and organisms live and grow.

**Suspended solids:** Particulate matter, such as silt or clay that is entrained within a water column (i.e., has not settled to the substrate)

**Spawning habitat:** Fish habitat associated with the breeding of fish.

**Watercourse:** Any channel carrying water, either continuously or intermittently.

**Wildlife tree:** A standing live or dead tree with special characteristics that provide valuable habitat for wildlife. Characteristics include large diameter and height for the site, current use by wildlife, declining or dead condition, value as a species, valuable location, and relative scarcity.

**WLAP:** British Columbia Ministry of Water, Land and Air Protection, the former name of the present Ministry of Environment.

**Woody debris:** Sound and rotting logs and stumps that provide cover for fish and wildlife.

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- Crack Sealing Asphalt Pavements (T-1/99)
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